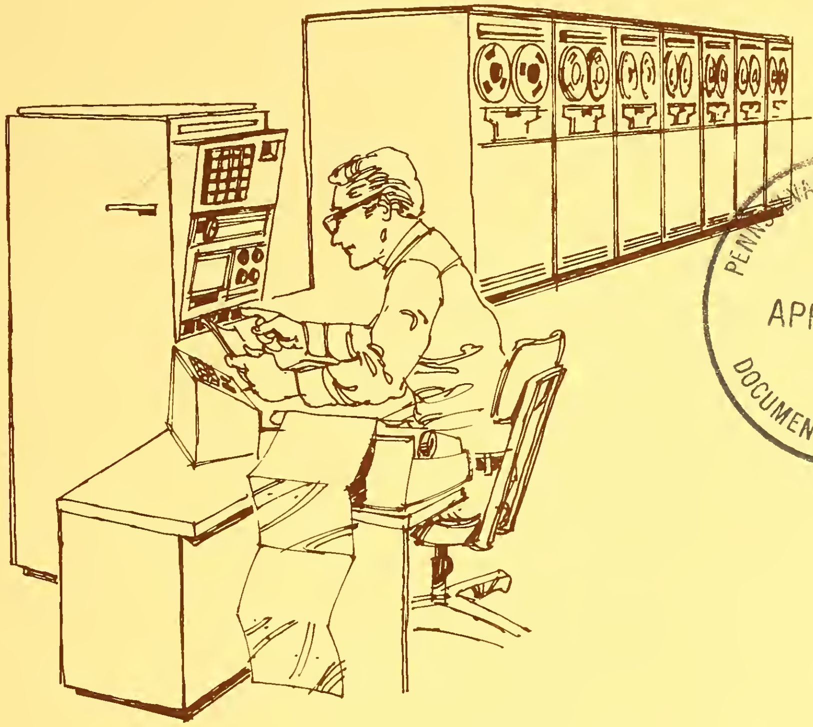
C 51.11/5 : C 73

PB-289 952

A DIRECTORY OF
COMPUTER SOFTWARE APPLICATIONS



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Communications

1970-January, 1979

NTIS U.S. DEPARTMENT OF COMMERCE—National Technical Information Service

PB-289 952

A DIRECTORY OF
COMPUTER SOFTWARE APPLICATIONS

Communications

1970-January, 1979

U.S. DEPARTMENT OF COMMERCE
National Technical Information Service
5285 Port Royal Road
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16. Abstract (Limit: 200 words)

Communications reports that list computer programs and/or their documentation are cited. These software applications pertain to topics, such as satellite communications, radio wave propagation, communication networks, frequency allocation, speech intelligibility and processing, digital communications, signal and message processing, and communication theory. The directory contains complete bibliographic data for each report as well as a subject and a corporate author index.

The computer software offered by NTIS was created by a variety of Federal agencies to meet their diverse but quite specific objectives. It is provided without installation, support, or maintenance services and sometimes required customer modifications to run effectively in customer environments.

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(See ANSI-Z39.18) See *Instructions on Reverse*

OPTIONAL FORM 272 (4-77)
(Formerly NTIS-35)
Department of Commerce

CONTENTS

Introduction V
How To Use VII
Abstracts 1
Subject Index 53
Corporate Author Index 71
Order Blank .... At End

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A10	9.25	E10	20.00	T10	550.00
A11	9.50	E11	22.50	T11	600.00
A12	10.75	E12	25.00	T12	650.00
A13	11.00	E13	28.00	T13	675.00
A14	11.75	E14	31.00	T14	750.00
A15	12.00	E15	34.00	T15	800.00
A16	12.50	E16	37.00	T16	850.00
A17	13.00	E17	40.00	T17	900.00
A18	13.25	E18	45.00	T18	950.00
A19	14.00	E19	50.00	T19	1,000.00
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The technical reports announced by NTIS often contain listings of computer programs and/or documentation covering a wide variety of applications.

The object of this directory is to announce to the scientist, systems analyst, and programmer, the availability of these computer programs, and to disseminate this software as fully as possible to fulfill NTIS' role in information transfer.

These computer program listings or the documentation can be purchased for the regular price of the technical report in either hard copy or microfiche, thereby providing the user with a viable piece of software at an exceptionally low price.

If there are any questions, comments, or suggestions please contact David Grooms, Product Manager (703) 557-4672.

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HOW TO USE

Abstract Entry

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Corporate author

Title of document

PB-239 100/1CP PC A12/MF A01
Bechtel, Inc., San Francisco, Calif.
Path to Self-Sufficiency Directions and Constraints. Appendices
Final rept. on Phase 1.
Aug 74, 267p* Rept no. BECHTEL-10900-74-43-I-App
Grant NSF-C867

Keywords — used for indexing and searching

Descriptors: *Energy supplies, *Computer programs, Crude oil, Natural gas, Coal, Oil shale, Uranium, Thorium, Bituminous sands, Hydroelectric power generation, Geothermal prospecting, Solar energy conversion, Wastes, Systems analysis, Systems engineering, Capitalized costs, Fossil fuel deposits, Transportation, Planning, Forecasting, Algorithms, Flow charting, Mathematical models, FORTRAN.

Abstract of document

A computer program that calculates resource requirements and summarizes results for any fuel mix is presented. The program tabulates an annual schedule of required facilities to be brought on-line and attendant annual schedules of capital (2 classes), manpower (4 types), and materials (9 categories) requirements. The model is exercised for two likely fuel mixes and the implications in terms of anticipated capital, manpower, and materials constraints are discussed.

Subject Index Entry

Subject Term.—These are arranged in alphabetical sequence in the Index

Title

Order number. Documents in the abstract section are sequenced alphanumerically by this number.

ENERGY SUPPLIES

Energy System Network Simulator (ESNS). Ii. A User's Guide
BNL-20979 9B

Path to Self-Sufficiency Directions and Constraints
PB-239 099/5CP

Path to Self-Sufficiency Directions and Constraints. Appendices
PB-239 100/1CP 21D

An Economic Analysis of Declining Petroleum Supplies in Texas: Income, Employment, Tax and Production Effects as Measured by Input-Output and Supply-Demand Simulation Models
PB-243 320/9CP 08I

Corporate Author Index Entry

Corporate author

Title

Order/accession number

BECHTEL, INC., SAN FRANCISCO, CALIF.

BECHTEL-10900-74-43-I
Path to Self-Sufficiency Directions and Constraints
PB-239 099/5CP 21D

BECHTEL-10900-74-43-I-App
Path to Self-Sufficiency Directions and Constraints. Appendices
PB-239 100/1CP 21D

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COMMUNICATIONS

AD-A000 670/0CP PC **A05**/MF **A01**
Army Electronics Command Fort Monmouth N J
Convolutional Decoder Performance on VHF and Troposcatter Channels
Final rept.
Gregory C. Ranieri, and John E. Quigley. Sep 74, 97p Rept no. ECOM-4264

Descriptors: *Decoders, Demodulators, Decoding, Error correction codes, Algorithms, Coders, Computer programs, Tactical communications, Very high frequency, Tropospheric scatter communications.

Convolutional codes are quite powerful, easily implemented error correcting codes. Decoders for these codes can be probabilistic or deterministic. The primary decoders investigated were the Massey diffuse decoder (fixed, deterministic), the adaptive Gallager decoder (adaptive, deterministic) and the Viterbi decoder (Probabilistic). A limited number of simulations of these decoders were conducted using troposcatter and VHF channel error data. Comparative results and conclusions are discussed. (Author)

AD-A000 825/0CP PC **A07**/MF **A01**
Oklahoma State Univ Stillwater Center for Systems Science
Spatial Stochastic Analysis of EMP Transients
Final rept. 20 Jun 73-1 Mar 74
C. S. Sims, and Y. Park. Mar 74, 131p Rept no. CS-74-1
Contract DAAG39-73-C-0244

Descriptors: *Signal processing, *Kalman filtering, Stochastic processes, Electromagnetic pulses, Sampling, Wave equations, Computer programs, Transients.

In the study an investigation is made of applying Kalman filtering, fixed interval linear smoothing, and other signal processing techniques to problems where various forms of the wave equation are applicable. Randomness in time, space, and initial distribution is allowed to generate random solutions to the wave equation, and these solutions are estimated based on noisy observations. The methodologies involved are based primarily on sinusoidal expansions, and the underlying principle is to try to estimate the solution by estimating a finite number of parameters.

AD-A002 259/0CP PC **A04**/MF **A01**
Naval Electronics Lab Center San Diego Calif
A Simplified Mode Conversion Program for VLF Propagation in the Earth-Ionosphere Waveguide
Interim rept.
Richard A. Pappert, and Linda R. Shockey. 1 Oct 74, 64p Rept no. NELC-IR-751

Descriptors: *Radio transmission, *Ionospheric propagation, Very low frequency, Computer programs, Modes, FORTRAN.
Identifiers: FORTRAN 4 programming language.

This report presents a variation of an earlier mode conversion program for numerically determining mode conversion coefficients and mode sums for a waveguide which is inhomogeneous along the direction of propagation (invariance normal to the transmitter receiver line is assumed and reflections due to the horizontal inhomogeneity are neglected). Although somewhat more approximate than the earlier program the present version has the advantage of not requiring a full wave fields program for the height gain calculations and can be implemented with about the same ease as a WKB program. It has one advantage over the WKB formulation and that is that mode numbering along the horizontal inhomogeneity is immaterial. The mode conversion program will yield mode conversion coefficients and a mode sum plot for ground based vertical dipole excitation of the vertical electric field at the ground as a function of distance from the transmitter. Since the mode conversion coefficients are independent of transmitter terminator distance, allowance has also been made for incrementing the latter distance and plotting mode sums for the incremented distances.

AD-A002 489/3CP PC **A06**/MF **A01**
Institute for the Future Menlo Park Calif
ARPA Policy-Formulation Interrogation Network
Final rept. 6 Mar 72-31 Dec 74
Jacques Vallee, Hubert M. Lipinski, and Richard H. Miller. 31 Dec 74, 118p Rept no. SR-34
Contract DAHC15-72-C-0165, ARPA Order-2005

Descriptors: *Central processing units, *Communications networks, Time sharing, Computer programming, Information retrieval, Decision making, Interfaces, Message processing.
Identifiers: *ARPA computer network, *Computer networks, FORUM computer program, Teleconferencing.

This report describes the findings of a project to develop a network conferencing capability. Six versions of a program named FORUM have been written and tested in a variety of applications. In addition, limited experience with the development of a voice capability is reported. The documents appended to this report provide greater detail on the architecture and operation of the network conferencing program (FORUM-5) and of the file structure supporting a more advanced prototype (FORUM-6).

AD-A003 275/5CP MF **A01**
Signatron Inc Lexington Mass
A Fortran HF Channel Simulator and HF Channel Effects on Performance of Multitone Modems
Steven H. Richman, and Peter Monsen. 12 Jul 72, 284p
Contract DAAB03-72-C-0263
Availability: Available in microfiche only.

Descriptors: *Phase modulation, *Radio transmission, High frequency, Phase shift, Modems, Attenuation, Multipath transmission, Computerized simulation, Mathematical models, Distribution functions, Statistical analysis, Computer programs, FORTRAN.

This report presents the results of a study of the effects of the HF channel on an attenuation shift keying - phase shift keying modem. Included is a description of an all-software FORTRAN HF simulator using a complex tapped delay line model of the HF channel, as well as a listing and flow chart of the final computer program.

AD-A003 806/7CP PC **A03**/MF **A01**
New Mexico Univ Albuquerque Bureau of Engineering Research
Two Programs for Speech Recognition and System Identification Research
Interim rept.
J. T. Cordaro. Aug 74, 26p Rept no. EE-223(74)AFOSR-222-3
Grant AF-AFOSR-2178-72

Descriptors: *Speech recognition, Computer programs, Noise, Speech analysis, Data processing, Computational linguistics, Fourier transformation.
Identifiers: PDP-8/E computers, Fast Fourier transform.

Two programs used for research in automatic speech recognition and in system identification are described in this report.

AD-A003 896/8CP PC **A09**/MF **A01**
Naval Electronics Lab Center San Diego Calif
Information System Theory
Final rept. 1 Jul 72-1 Jul 74
J. C. Tiernan, and K. Kaufmann. 22 Jul 74, 199p Rept no. NELC/TD-355

Descriptors: *Information theory, *Data transmission systems, Computer programs, Nonlinear programming, Coding, Decoding, Computations.
Identifiers: DFLT2 computer program, IBM 360/65 computers.

Energy distribution, giving greatest rate performance, has been numerically determined for the first-order autoregressive channel with noiseless feedback when a center-of-gravity processor is used. Determination was made during investigation on communication systems with potential Navy application. A powerful nonlinear programming computer program, using a new algorithm, has been developed to solve constrained nonlinear problems.

AD-A004 158/2CP PC **A08**/MF **A01**
California Univ Los Angeles Dept of Computer Science
A Speech Processing System
Interim rept.
Sabina H. Saib. Sep 74, 166p UCLA-ENG-7453, AFOSR-TR-75-0069
Grant AF-AFOSR-2384-72
Computer Methodology Series rept.

Descriptors: *Phonology, *Speech recognition, *Voice communications, English language, Signal processing, Computer programs, Algorithms, Theses.
Identifiers: IBM 360/91 computers, Vowels.

This thesis describes the development of a system which was used to study features in continuous speech. The study was limited to English vowels spoken in sentences. The voices of thirteen speakers, both male and female were used in an effort to study features in continuous speech. In particular, the study concentrated on a search for those features which are speaker invariant and those features which have not been studied in the past. This speech processing system was implemented on an IBM 360/91 general purpose computer. Data was collected in the UCLA Phonetics Laboratory and at the Systems Development Corporation.

AD-A004 211/9CP PC **A09**/MF **A01**
Purdue Univ Lafayette Ind
Performance Monitors for Digital Communications Systems Part II
Technical rept.
B. J. Leon, J. L. Hammond, R. B. Bode, and W. E. Sears. Dec 74, 177p RADC-TR-74-318
Contract F30602-72-C-0438
Prepared in cooperation with Georgia Inst. of Tech., Atlanta.

Descriptors: *Pulse communications, Digital systems, Monitors, Standards, Monitoring, Computerized simulation, Communications networks, Synchronization(Electronics), Computer programs.

The report consists of three parts. The first part investigates performance monitors for a digital system that uses a three-level partial response wave form for digital signaling. A hybrid simulation of such a system was made and various methods of amplifying the bit error rate were investigated. It was found that a null zone detection scheme was the best monitor. The second section of the report investigates an extension of the pseudo-error concept from DCEO H700-1 to a monitor scheme that examines the received signal and classifies the signal in various bins. The report discusses the relation between the number of signals received in each bin with various sources of system degradation. This approach shows promise for fault isolation. The third section of the report deals with the problem of synchronization in a digital system. It shows how synchronization can be monitored by estimating the statistical parameters of buffer storage.

AD-A004 975/9CP PC **A14**/MF **A01**
Southern Methodist Univ Dallas Tex Information and Control Sciences Center
Minimal Rate Digital Voice Transmission
Final rept. 1 May 72-30 Jun 73
S. C. Gupta, and D. L. Cohn. 30 Jun 73, 310p
Contract DCA100-72-C-0023

Descriptors: *Voice communications, *Pulse communications, Digital systems, Rates, Coding, Speech compression, Spectrum analysis, Walsh functions, Data transmission systems, Distortion, Computer programs, FORTRAN.
Identifiers: FORTRAN 5 programming language.

In the report the recent developments of rate distortion theory are applied to the digital encoding methods for speech, with the emphasis on waveform encoding rather than on vocoders. The report is concerned with the broad class of digitized speech processors which are based on the principle of predictive encoding. The important contribution of the rate distortion analysis is the evaluation of the potential efficiency of a particular digital transmission structure. This is accomplished by the rigorous establishment of a lower bound on the digital transmission rate for a given distortion measure.

AD-A005 171/4CP PC **A13**/MF **A01**
Purdue Univ Lafayette Ind
Performance Monitors for Digital Communications Systems
Final rept. Feb 72-Feb 73
Benjamin J. Leon, R. T. Kitanara, J. L. Hammond, and T-C Huang. Jun 73, 283p
Contract F30602-72-C-0438
See also Summary report, AD/A-005 172.

Descriptors: *Pulse communications, *Monitors, Digital systems, Errors, Multiplexing, Computer programs.

The Defence Communications System is to have a test system capable of estimating the bit error rate of a receiver without disrupting the traffic flow or introducing special streams of test data. This system should, in addition, provide an estimate of the error rate in reasonably short periods of time, even when the actual error rate is very low. In this study several performance monitoring schemes are investigated. They include, Gooding's pseudo-error scheme, format violation detectors, and visual indicators.

AD-A006 310/7CP PC **A02**/MF **A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
A Locally-Organized Parser for Spoken Input
Journal article
Perry L. Miller. Sep 73, 11p JA-4302, ESD-TR-74-335
Contract F19628-73-C-0002, ARPA Order-2006
Availability: Pub. in Communications of the Association for Computing Machinery, v17 n11 p621-630 Nov 74.

Descriptors: *Parsers, *Speech recognition, Computer programming, Phonemes, Information theory, Uncertainty, Errors, Precision, Confidence level, Information processing, Signal processing, Reprints.
Identifiers: LPARS computer program.

This paper describes LPARS, a locally-organized parsing system, designed for use in a continuous speech recognizer. LPARS processes a string of phonemes which contains ambiguity and error. The system is locally-organized in the sense that it builds local parse structures from reliable word candidates recognized anywhere in an input utterance. These local structures are used as 'islands of reliability' to guide the search for more highly garbled words which might complete the utterance. (Author)

AD-A006 426/1CP PC **A11**/MF **A01**
Princeton Univ N J School of Engineering and Aplied Science
Simulation Model for New York Air Traffic Control Communications
Interim rept. Jul 73-Jun 74
J. S. Hunter, and D.-A. Hsu. Feb 75, 243p FAA-NA-74-172
Contract DOT-FA72NA-741
See also AD-782 437 and AD-782 739.

Descriptors: *Air traffic, *Air traffic control systems, *Voice communications, Communications networks, Communications traffic, Data transmission systems, Computer programs, New York.
Identifiers: Communications queueing, DOT/4DZ/DA, DOT/4IZ/ID, New York City(New York).

This volume describes the construction, validation, and application of a simulation model for air traffic control (ATC) communications. The model is based upon an extensive statistical analysis of voice communications data gathered over the New York area during a busy 2-hour period. The structure of the simulation model is discussed along with the associated GPSS V program. The input parameters are outlined, and various master tables and equations are employed to capsulate the information provided by the earlier statistical analyses. Methods for validating the simulation model are described for particular sectors and sector functions. A new statistical testing procedure for comparing both simulated and historical time series traces is evoked. The responses of major interest are the aircraft loading, channel utilization, and communications queueing, the last of which can only be secured through simulation.

AD-A006 449/3CP PC **A02**/MF **A01**
Signals Research and Development Establishment Christchurch (England)
GOSPRE - A Simple Analytical Program for Computing Grade of Service in a Heavily Loaded Communications Network
F. B. Johnson. Aug 74, 21p SRDE-74018, DRIC-BR-44152

Descriptors: *Communications networks, Mathematical analysis, Computer programs, Computerized simulation, Communications traffic, Mathematical models, Predictions, Great Britain.
Identifiers: GOSPRE Computer program.

A simple analytical procedure has been devised, together with a computer program for applying it, whereby system average quantities such as Grade of Service are predicted for a communications network operating under conditions where relatively heavy traffic makes source and sink blocking a more significant cause of call attempt failure than is blockage on the trunk part of the network. The program is designed to handle a situation where the offered traffic arises from subscriber units which may have from 1 up to 8 independent connections into the network.

AD-A006 652/2CP PC **A06**/MF **A01**
Naval Research Lab Washington D C
Improvements in Routing for Packet-Switched Networks
Interim rept.
Caldwell McCoy, Jr. 18 Feb 75, 125p Rept no. NRL-7846
Contract DARPA Order-2275

Descriptors: *Communications networks, *Routing, Time sharing, Network flows, Queueing theory, Mathematical models, Stochastic processes, Dynamic programming, Computer programs, Computerized simulation.
Identifiers: *Computer networks, ARPA computer network.

Adaptive routing algorithms in store-and-forward communication networks are demonstrated to decrease average message delay, to increase message throughput, and to decrease the number of undelivered messages. Comparisons of existing adaptive routing techniques are presented to provide the basis for extension of the theory in two areas: priority assignment for messages reaching an assigned aging threshold, and prevention of messages looping within the network. Optimization of a defined measurement parameter, throughput factor, phi (t,k) is performed in terms of the priority threshold setting k. A closed form solution for phi (t,k) is obtained on a 3-node network assuming infinite buffers and fixed routing. Included are simulations on damaged and undamaged systems for specific inter-connected networks with finite buffers and adaptive routing. Comparisons are made for the predicted phi (t,k) versus the simulated results on an undamaged network.

AD-A006 929/4CP PC **A05**/MF **A01**
Ohio State Univ Columbus Electroscience Lab
The Development of a Multiturn Loop Antenna for the AN/PRC-77
Technical rept.
R. J. Davis. Dec 74, 92p Rept no. ESL-3824-1
Contract N00123-74-C-0645

Descriptors: *Loop antennas, *Transmitter receivers, Manportable equipment, Omnidirectional antennas, Antenna radiation patterns, Computer programs, Theses.
Identifiers: AN/PRC-77, AN/PRC-25.

An electrically small antenna element, the multiturn loop, is proposed as a replacement for the three-foot monopole standard on the AN/PRC-77 and AN/PRC-25. The principal objective was to develop a multiturn loop with an omnidirectional pattern and approximately the gain of the standard monopole. Based on past experience with multiturn loop antennas, loop configurations were selected which would minimize the increase in packset size for top, bottom and back-side mounting locations. Patterns were measured for these configurations and compared with patterns of the standard monopole antenna. Parameters were varied (loop size, turn spacing and position on the packset) to optimize the radiation efficiency of the multiturn loop.

AD-A007 719/8CP PC **A02**/MF **A01**
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
Using a Two-Dimensional Discrete Hilbert Transform to Factor Two-Dimensional Polynomials
Dan E. Dudgeon. 1974, 19p
Contract N00014-67-A-0204-0064
Availability: Pub. in Quarterly Progress Report N
113, p143-158, 15 Apr 74.

Descriptors: *Signal processing, *Fourier transformation, *Digital filters, Difference equations, Polynomials, Computer programs, Recursive filters, Two dimensional, Reprints.
Identifiers: Digital signal processing, Discrete Hilbert transform.

In this report, a two-dimensional Hilbert transform is derived. This Hilbert transform can be used to construct the imaginary part of the Fourier transform from the real part of the Fourier transform for arrays of a particular form. An approximation to this Hilbert transform, termed a discrete Hilbert transform (DHT), is then derived. This DHT can be implemented as a computer program by using discrete Fourier transforms (DFTs). This report deals with the question, what conditions are sufficient to guarantee that a given two-dimensional difference equation can be iterated so that every output point may be calculated, given the input and an appropriate set of initial (or boundary) conditions. In so doing, we generalize the concept of causality and also present recursible difference equations in a more general form than those widely given heretofore. (Author)

AD-A009 903/6CP PC **A07**/MF **A01**
Naval Postgraduate School Monterey Calif
A Study of Naval Administrative Telephone System Management
Master's thesis
Joseph Henry III Steele. Mar 75, 147p

Descriptors: *Telephone systems, *Management, Systems engineering, Naval equipment, Theses, Computer programs.
Identifiers: COBAL.

The thesis is a study of Naval administrative telephone management organization and practices. The model used in the study is the Naval Postgraduate School, Monterey, California. The current management organization, both local and national, is discussed. A Proposal for future organizational relationships at the Naval Postgraduate School to deal with telephone systems as a part of Naval telecommunications is presented. The various components of a telephone system are described. System management practices are explored in depth to include system planning, standards, cost factors, and methods of evaluation. Particular emphasis is given to toll call and inventory procedures. A basic doctrine for system guidelines and standards is developed along with a format for a computerized local equipment inventory listing. The overall conclusion is that Naval administrative telephones are not being managed as a system. Specific recommendations for management improvement are offered.

AD-A010 221/0CP PC **A04**/MF **A01**
Sperry UNIVAC St Paul Minn Defense Systems Div

Prosodic Aids to Speech Recognition: VI. Timing Cues to Linguistic Structure and Improved Computer Programs for Prosodic Analysis
Semiannual technical rept. 1 Sep 74-28 Feb 75
Wayne A. Lea, and Dean R. Kloker. 31 Mar 75, 70p Rept no. PX-11239
Contract DAHC15-73-C-0310, ARPA Order-2010
See also report dated 31 Oct 74, AD-A003 931.

Descriptors: *Speech recognition, *Phonetics, Speech analysis, Computational linguistics, Syntax, Phonology, Time, Computer programming, Syllables, English language.
Identifiers: *Prosodic analysis, *Intonation.

Computer programs for detecting syntactic boundaries (BOUND3) and locating stressed syllables (STRESS) have been supplied to ARPA contractors. Descriptions of the operation and performance of these programs are provided, and suggestions for further improvements in these programs are given. Experiments were conducted on various timing cues that correlate with phonological and syntactic phrase boundaries. Further experiments are planned, dealing with carefully controlled studies of how prosodic information gives cues to the type of sentence spoken, the appropriate syntactic bracketing to assign, and the occurrence of subordination. Further studies of the BOUND3 and STRESS programs will be conducted, and improved versions of those prosodic analysis programs will be used to aid parsing and word matching in ARPA speech understanding systems.

AD-A011 083/3CP PC **A03**/MF **A01**
Signals Research and Development Establishment Christchurch (England)
A Computer Program for the Simulation of Store and Forward Telegraph Networks
W. J. Cullyer, P. H. Masterman, and M. C. Butler. Oct 74, 46p SRDE-73038, DRIC-BR-46207

Descriptors: *Telegraph systems, *Communications networks, Computerized simulation, Message processing, Switching, Great Britain.

A description is given of a means of simulating the flow of telegraph messages through a network of store-and-forward switches. Messages may be multi-address and have any one of five levels of precedence. The modelling process is carried down to the level of individual subscribers. Buffers within the switches are represented in a simple manner but no other aspects of the internal operation of switches are modelled. The output facilities are comprehensive and include gross statistics, such as median delays for each level of precedence, as well as more detailed information.

AD-A011 151/8CP PC **A02**/MF **A01**
California State Univ San Jose Dept of Speech-Communication
Proximity: Location, Time, and Opportunity to Communicate
Technical rept.
Peter R. Monge, and Kenneth K. Kirste. Mar 75, 24p Rept no. TR-3
Contract N00014-73-A-0476-0001

Descriptors: *Social communication, *Behavioral science, *Group dynamics, Range(Distance), Organization theory, Social psychology, Probability, Mathematical models, Computer applications, Interpersonal relations, Position(Location), Time.
Identifiers: Proximity, Social distance, Psychological distance, PROXVAL computer program.

Traditional measures of proximity all share three common weaknesses: (1) they are based upon ratio-level measurement of physical distance that may not correspond to 'psychological distance,' (2) they measure distance as a fixed rather than a variable quantity, and (3) they measure distance between pairs of individuals rather than larger groups of people. A conceptualization of proximity which attempts to deal with these problems for use in large organizations is developed. Proximity is defined as the probability of people being in the same location at the same point in time, creating an opportunity for face-to-face communication made possible by time and space. A computer program, PROXVAL, is described. Two studies, which report attempts at testing the procedure, are reported.

AD-A011 453/8CP PC **A06**/MF **A01**
Office of Telecommunications Boulder Colo Inst for Telecommunication Sciences
Probabilistic Interference Prediction Model-Computer Programs
Final rept. Jan 74-Jan 75
John R. Juroshek. Feb 75, 108p FAA-RD-75-33
Contract DOT-FA74WAI-441

Descriptors: *Radiofrequency interference, *Frequency allocation, Probability, Mathematical models, Computer programs, Monte Carlo method, Very high frequency, Statistical analysis, Air traffic control systems, Mobile, Communication and radio systems.
Identifiers: DOT/4HZ/HD.

The report describes a statistical method for predicting interference between air traffic control frequency assignments in the VHF aeronautical mobile frequency band. This procedure results in a probability of interference representing the statistical chances of interference occurring between two air traffic control sectors operating on co-channel of adjacent channel frequency assignments. The model accounts for both the spatial distribution of the interfering aircraft as well as the statistical nature of voice communications. Two computer programs are described for computing probability of interference given the pertinent geometry of the victim and interfering sectors as well as their air/ground channel utilization figures. One of the computer programs uses Monte-Carlo methods to arrive at the answer while the other solves a deterministic set of equations to obtain an approximate solution at a considerable savings in computer execution time. The report also examines the problem of probability of interference given multiple interfering air traffic control sectors and concludes that for small victim sectors the source of interference is very likely to be one particular interfering sector. Large victim sectors, however, can experience nearly equal interference from more than one sector.

AD-A012 230/9CP PC **A09**/MF **A01**
TRW Systems Group San Bernardino Calif Minuteman Communications and Command Dept
MINUTEMAN FSD Communications Study Report
Final rept.
D. Vassilakos, and T. R. Hooton. May 75, 181p TRW-26048-11850TU-00, SAMSO-TR-75-122
Contract F04701-74-C-0327

Descriptors: *Surface to surface missiles, *Hardened structures, *Communications networks, Command and control systems, Communications central, Launching sites, Guided missile silos, Secure communications, Computer programs, Modems, Computerized simulation.
Identifiers: Minuteman.

The present MINUTEMAN Cable Termination Equipment (CTE) design, most of which was developed in the 1950's using discrete components, was a good design for that era but by present (1975) standards it is large, sluggish and cumbersome. Thus, the goal of this program was to investigate the present state-of-the-art and to develop a reliable system with much improved performance using modern but proven techniques. Other design objectives were to increase hardness and decrease cost. A programmable processor was chosen to maximize operational efficiency, flexibility and growth capability.

AD-A012 740/7CP PC **A10**/MF **A01**
Stanford Research Inst Menlo Park Calif
Speech Digitization Excitation Study
Final rept.
D. T. Magill, C. K. Un, and S. E. Cannon. Mar 75, 216p Rept no. SRI1526-8-FR
Contract DAHC04-75-C-0007

Descriptors: *Speech recognition, *Coding, Pitch discrimination, Vocoders, Extraction, Multiplexing, White noise, Quantization, Signal to noise ratio, Algorithms, Computer programs.
Identifiers: Linear predictive coding, Data transmission, BASIC programming language.

This report presents the results of research on speech excitation signals in linear predictive coding (LPC) of speech. Initially, the research was pursued in two basic areas, the long-term memory approach (pitch extraction) and the short-term memory approach (residual encoding). Later, all of the effort was devoted to the short-term memory approach, because this was considered the more promising. In the long-term memory area, the authors studied the problem of tracking a deconvolved glottal wave extracted from the residual signal of a linear prediction filter, and the feasibility of using formant-isolation techniques for time-domain pitch extraction. In the short-term memory area, the authors investigated various methods of encoding the residual signal to be used as an excitation signal of the LPC synthesizer. The major result of our research in the short-term memory area is the development of the residual-excited linear prediction (RELP) vocoder. The RELP vocoder offers the advantages of the linear predictive method with those of the voice-excited vocoder.

AD-A013 107/8CP PC **A04**/MF **A01**
Mitre Corp Bedford Mass
Computer Simulation of MUX Bus Voltage Waveforms under Steady State Conditions
Technical rept.
R. A. Costa. Jun 75, 71p MTR-2948, ESD-TR-75-67
Contract F19628-75-C-0001

Descriptors: *Avionics, *Bus conductors, *Computerized simulation, *Multiplexing, Reliability(Electronics), Costs, Voltage, Waveforms, Airborne, Electric cables, Shielding, Fortran, Computer programs, Equations, Steady state, Transformers, Resistors, Remote terminals.
Identifiers: Computer software, Twisted pair, Fortran 4 programming language, Fault isolation.

Digital techniques involving multiplex busing are being advocated in many quarters as a means of satisfying the need for greater reliability, decreased modification cost, and simplified maintenance of airborne avionics systems. This paper documents efforts to develop a computer simulation of a shielded, twisted pair cable multiplex bus with multiple subscribers using steady state equations. The simulation predicts voltage waveforms, driving point impedances, and power distributions for systems compatible with MIL-STD-1553 (USAF). Excellent agreement has been found between laboratory observations and the computer simulation, validating this approach. (Author)

AD-A013 369/4CP PC **A03**/MF **A01**
Army Electronics Command Fort Monmouth N J
Life Cycle Cost Model
Final rept.
Thomas W. Otto, Jr. Jul 75, 39p Rept no. ECOM-4338

Descriptors: *Cost estimates, *Cost analysis, *Radio equipment, Life cycles, Learning curves, Communication and radio systems, Army procurement, Management planning and control, Mathematical models, Computer programs, Tactical communications, Costs.
Identifiers: *Life cycle costs.

Recent experience in performing Life Cycle Cost Analyses on single channel tactical radio equipment has shown the need for a complete and computerized LCC model. This report discusses such a model which has been developed by the author. The cost categories and each of their elements are presented initially in broad terms; then the mathematical equations which compute each element are presented. Additionally, a comprehensive discussion of the Learning Curve and various methods of applying it are presented. (Author)

AD-A013 730/7CP PC **A11**/MF **A01**
Purdue Univ Lafayette Ind School of Electrical Engineering
SYMRAP -- A Symbolic Reliability Analysis Program
Phrase rept.

P. M. Lin, B. J. Leon, and C. Lisboa. May 75,
244p RADC-TR-75-136
Contract F30602-72-C-0438

Descriptors: *Communications networks, *Reliability(Electronics), Network flows, Mathematical models, Computer programs, Stochastic processes, Switching circuits, Theorems.
Identifiers: Graph theory, SYMRAP computer program, Switching theory, Network analysis theory.

This report describes the major contribution of a research effort to identify methods to be used regarding the collection and processing of data which are required for system control of a switched digital integrated communication network. At the early stages of the effort it was discovered that decisions on data collection could not be made until a good network analysis algorithm was devised. One of the major items needed in the analysis was a fast algorithm for computing terminal-pair reliability for a probabilistic graph. This report describes the algorithm developed as well as presenting a documented computer codes with users manual and examples. The body of the report is written for one who has some familiarity with communications network theory and probabilistic graphs.

AD-A014 542/5CP MF **A01**
Defense Communications Agency System Engineering Facility Reston Va
Store-and-Forward Network Performance Model (MODI)
Technical note
M. J. Fischer. Dec 72, 61p Rept no. DCASEF-TN-2-72

Descriptors: *Communications networks, Data storage systems, Data transmission systems, Mathematical models, Message processing, Communications traffic, Data processing, Queueing theory, Flow charting, Computer programs.

A model is described that can be used to analyze a store-and-forward communications network with multiple priority levels. The model employs analytic procedures and has two modes of operation, behavioral and synthesis. The general nature of the model is discussed as well as its inputs, outputs, and logic. (Author)

AD-A015 960/8CP PC **A05**/MF **A01**
Naval Academy Annapolis Md
Advance Identification of Catastrophic Traffic Build-Up in the Naval Telecommunication Command
Research rept.
Louis T. Roumaya. 2 Jun 75, 95p Rept no. USNA-TSPR-73
Report on a Trident Scholar Project.

Descriptors: *Communications traffic, *Message processing, *Telecommunication, *Radio broadcasting, Control, Scheduling, Automation, Fleets(Ships), Command and control systems, Computerized simulation, Computer programs, Digital computers, Naval equipment, Naval operations.

The Naval Telecommunication Command (NAVTELCOM) carries out for the Chief of Naval Operations, The Dept. of Navy's responsibilities for defense telecommunications. A fundamental problem with the FLeet Broadcast occurs because the new Automated Broadcast Stations can receive and process message faster than the ships of the fleet can receive them. Message backlogs result and corrective measures must be taken. The thrust of this project was an analysis of the various measures to prevent and deal with backlogs occuring in these stations. It focused on the Navy's Automated Communications Station at Norfolk, which is the model for four other systems around the world. Their operation of the Fleet Broadcast was studied and modeled. To evaluate the impact of the proposed changes and other possible changes a computer program for simulating the operation of the Fleet Broadcast was prepared for use on the Naval Academy's Computer System and it is discussed in Appendix B., and listing of the program is included. The report suggests several early implementable changes in the way the broadcast is managed - to improve its operation. (Author)

AD-A016 590/2CP PC **A11**/MF **A01**
Duke Univ Durham N C Dept of Electrical Engineering
Adaptive Optimum Array Tracking Detectors
Technical summary rept. 1974-75
Charles S. Liu. Aug 75, 240p Rept no. TR-11
Contract N00014-75-C-0191

Descriptors: *Signal processing, Bayes theorem, Antenna arrays, Waveforms, Markov processes, Signal to noise ratio, White noise, Coding, Fourier transformation, Computer programs, Beam forming, Computerized simulation.
Identifiers: *Signal detection, Parameter estimation.

The purpose of this study is to measure the performance degradation of array processors due to incorrect spatial a priori knowledge, and to further the theory of signal detectability for dynamic signals received by an array of sensors. Two classes of signal waveforms are considered in the first part of this report; one is the known waveform signal, the other is the Gaussian signal. For the known waveform case, an explicit functional form can be derived for the detectability index to characterize the performance loss. Performance results are shown for both the incorrect assumption about the signal location as well as the incorrect assumption about the directional noise location.

AD-A016 701/5CP PC **A02**/MF **A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
The CASPERS Linguistic Analysis System
Journal article
John W. Klovstad, and Lee F. Mondshein. 29 Mar 74, 8p MS-3727, ESD-TR-75-264
Contract F19628-73-C-0002, ARPA Order-512
Availability: Pub. in IEEE Transactions on Acoustics, Speech, and Signal Processing, vASSP-23 n1 p118-123 Feb 75.

Descriptors: *Computational linguistics, *Computer programs, *Speech recognition, *Acoustic signals, *Signal processing, Machine translation, Automation, Symbols, Transformations, Syntax, Memory devices, Word organized storage, Linguistics, Dictionaries, Reprints.
Identifiers: CASPERS(Computer automated speech perception system), Computer automated speech perception, Acoustic lexical interface, Context free grammar.

CASPERS (Computer-Automated Speech Perception System) is a user-modifiable facility for translating strings of acoustic symbols into sentences. Three distinctive aspects of the system's design will be discussed: the dynamic application of acoustic-phonological rules across word boundaries, an acoustic-unit splitting-and merging strategy for treating the dictionary matching problem, and an extensive capability for handling semantic routines within an augmented context-free grammar. (Author)

AD-A016 806/2CP PC **A07**/MF **A01**
Naval Research Lab Washington D C
AN/UYK-17(XB-1)(V) Signal Processing Element Microprogramming Support Software
Interim rept.
Tomlinson G. Rauscher, John D. Roberts, Jr, and W. David Elliott. 10 Oct 75, 126p Rept no. NRL-7777

Descriptors: *Digital computers, *Microprogramming, *Computer program documentation, *Signal processing, Computer applications, Arithmetic units, Radar, Sonar, Communication equipment, Prototypes, Input output devices.
Identifiers: *Computer software, All applications digital computer, Computer hardware, AADC(All Applications Digital Computer), AN/UYK-17(XB-1)(V), AN/UYK-17.

The AN/UYK-17 Signal Processing Element (SPE) is being developed at the Naval Research Laboratory to provide a high performance processing facility for radar, sonar, and communications systems. The design of the microprogrammable SPE nables realization of efficient, flexible solutions to problems that arise in digital signal processing tasks. The SPE is intended to be compatible with the Navy All Applications Digital Computer (AADC) now under development, and it is intended to be implemented as part of the AADC system. The SPE can also be used as a stand-alone processor.

AD-A017 377/3CP PC **A08**/MF **A01**
Illinois Univ At Urbana-Champaign Coordinated Science Lab
Hardware and Software Error Correction Coding
Final technical rept. Sep 71-Sep 74
R. T. Chien, R. B. Brown, C. L. Chen, and D. V. Sarwate. Aug 75, 159p RADC-TR-75-217
Contract F30602-72-C-0031

Descriptors: *Coding, *Error correction codes, *Data transmission systems, Signal processing, White noise, Computer programs, Shift registers, Decoding, Logic devices, FORTRAN.
Identifiers: Reed-Muller codes, Reed-Solomon codes, Fast Fourier transform, Cyclic codes, Majority logic decoding.

This report describes the results of a two phase project. In the first phase, a hardware coding system, which uses two newly developed decoding concepts, was designed and constructed. In the second phase, a software coding system was implemented. Several tradeoffs among alternative software implementations are given. The choice between hardware and software approaches is also considered.

AD-A017 483/9CP PC **A18**/MF **A01**
Aeronutronic Ford Corp Palo Alto Calif Western Development Labs Div
Raster Graphics Image Transformer
Final technical rept. 22 Jan 74-20 May 75
Frank Brierly, John McGuigan, and Werner Sepper. Jul 75, 411p WDL-TR-5851, RADC-TR-75-172
Contract F30602-74-C-0220
See also AD-770 342.

Descriptors: *Image processing, *Computer graphics, *Television display systems, Microprogramming, Read only memories, Logic circuits, Interfaces, Computer programs.

This report describes the design, theory of operation, and the results of testing a component of a high performance raster graphics system (image transformer). The purpose of the image transformer is to perform various processing functions on three dimensional point and polygon data. There are two categories of processing: transformation processing and window processing. These two categories include six functions: Transformation processing - (rotation, translation, scaling, concantenation); and Window processing - (backface surface elimination, clipping). In addition design documentation for the image transformer is contained in the Appendix. This includes logic diagrams and microprogram listings.

AD-A017 592/7CP PC **A06**/MF **A01**
Texas Univ At Austin Electronics Research Center
Two-Dimensional Digital Filtering and Its Uncorrelated Error Analysis
Technical rept.
Ming-Duenn Ni, and J. K. Aggarwal. 15 Jul 75, 109p TR-175, AFOSR-TR-75-1552
Contract F44620-71-C-0091, Grant NSF-GK-42790

Descriptors: *Digital filters, *Signal processing, Fourier transformation, Computerized simulation, Quantization, Linear programming, Computer programs.
Identifiers: Fast Fourier transformation, Recursive filters, Floating point operation, Fixed point theorems.

The concept of a two-dimensional recursive digital filter is introduced and block diagram representations are given. Error analyses for both floating-point and fixed-point two-dimensional digital filters are carried out. A systematic way of estimating the mean squared errors due to roundoff, coefficient and input quantizations is discussed. Norm error bounds are also derived. Simulations of the implementations of digital filters are discussed, and corresponding to these simulations error calculations are performed. Numerical examples are given. The derived analytic results are shown to be in good agreement with the simulation results.

AD-A017 677/6CP PC **A03**/MF **A01**
Mitre Corp Bedford Mass
The 'Standard' MUX Bus: Some Constraints on Information Flow Arising from MIL-STD-1553 (USAF)
Technical rept.
P. R. Cloud. Nov 75, 44p MTR-3041, ESD-TR-75-96
Contract F19628-75-C-0001

Descriptors: *Bus conductors, *Time division multiplexing, *Message processing, *Communications networks, Avionics, Specifications, Military requirements, Standards, Communications traffic, Control systems, Computer programs, Information transfer, Remote terminals, Word organized storage.
Identifiers: Constraints.

MITRE has designed, constructed, and operated an avionics time division multiplex bus compatible with the requirements of MIL-STD-1553 (USAF). In the course of engineering the software to perform the message control function for this network, some constraints on the message flow were encountered that are not immediately apparent when reading the standard. The purpose of this report is to alert the system designer to some of these potential difficulties. Four main topics are discussed: (1) Bus capacity; (2) A time constraint on message handling; (3) Subaddresses, and Data Word accessibility; and (4) Temporal characteristics of information transferred on the bus.

AD-A018 660/1CP PC **A03**/MF **A01**
Bolt Beranek and Newman Inc Cambridge Mass
Distributed Computation and TENEX-Related Activities
Quarterly progress rept. no. 4, 1 Aug-30 Oct 75
J. Burchfiel, R. Thomas, T. Myer, and R. Tomlinson. Nov 75, 39p Rept no. BBN-3210
Contract N00014-75-C-0773, ARPA Order-2901

Descriptors: *Data bases, *Message processing, *Computer files, *Data processing security, Networks, Computations, Distribution, Algorithms, Data acquisition, Computer programs, Computer printouts, Remote terminals, Modules(Electronics), Maintenance, Printers(Data processing), Department of Defense.
Identifiers: Computer software, TENEX system, Computer security, ARPANET.

This report describes continuing refinement of the TENEX RXEXEC distributed file system which supports geography-independent computing on a number of ARPANET TENEX sites. It describes BBN efforts to integrate TENEX into the National Software Works system. It also describes BBN efforts to upgrade existing ARPANET message service to meet NAVY requirements for an interactive message processing test at CINCPAC. (Author)

AD-A019 493/6CP PC **A08**/MF **A01**
Naval Postgraduate School Monterey Calif
Processing of the Manual Morse Signal Using Optimal Linear Filtering, Smoothing and Decoding
Engineer's thesis
Edison Lee Bell. Sep 75, 160p

Descriptors: *Signal processing, *Morse code, Kalman filtering, Decoding, Signal to noise ratio, Markov processes, Computations, Algorithms, Theses, Computer programs.
Identifiers: Viterbi decoding.

This thesis investigates the problem of automatic transcription of the morse signal, and describes and documents several approaches to filtering, processing, and decoding it for transcription. The baseband signal is first modeled as a modified random telegraph wave. A discrete Kalman filter and a linear smoother are then used to process the demodulated signal in order to gain a measure of the effectiveness and applicability of this model. It is shown experimentally that this model and processing yield a significant reduction in the transcription error rate. Next, a Viterbi decoder algorithm based on a simple Markov model of the code is programmed and tested. Finally, the baseband signal model is incorporated in a more general model for pre-detection Kalman filtering. It is shown that this filter permits acceptable recovery of morse signals whose average signal-to-noise ratio is as low as -14 dB in a 2 kHz bandwidth.

AD-A019 550/3CP PC **A04**/MF **A01**
Decisions and Designs Inc Mclean Va
Single Channel Ground and Airborne Radio Systems (SINCGARS) Evaluation Model
Technical rept. 7 Apr-15 Sep 75
James O. Chinnis, Clinton W. III Kelly, Rex D. Minckler, and Michael F. O'Connor. 15 Sep 75, 61p Rept no. DT/TR-75-2
Contract N00014-75-C-0426, N00014-73-C-0149

Descriptors: *Radio equipment, Trade off analyses, Radio links, Networks, Very high frequency, Frequency modulation, Procurement, Costs, Mathematical prediction, Computer programs, Tactical communications, Airborne, Manportable equipment.
Identifiers: AN/URC-78.

This report describes the development, validation, and utilization of a multi-attribute utility model and a probabilistic cost model for use by the SINCGARS Special Task Force (STF) in evaluating the military utility and cost of a series of alternative radio systems. These models were programmed to be interactive and were made available to the SINCGARS STF in order to permit additional analyses. A separate report was submitted to the SINCGARS STF on the development of these models. The major difference between that report and this report was the inclusion of appendices in the SINCGARS STF report providing more detailed information with respect to such factors as utility functions, importance weights, values of system parameters, and technical performance characteristics.

AD-A019 825/9CP PC **A05**/MF **A01**
Rome Air Development Center Griffiss AFB N Y
Parameter Selection for the Muntner-Wolf Model
Final technical rept.
Miles H. Bickelhaupt, Jr. Dec 75, 98p Rept no. RADC-TR-75-280

Descriptors: *Tropospheric scatter communications, *Data transmission systems, Errors, Computations, Signal to noise ratio, Mathematical models, Statistical analysis, Computer programs.
Identifiers: Muntner-Wolf model.

This study is concerned with parameter assignment to the Muntner-Wolf model representing error sequence generation by a real channel. The model describes the distribution of the errors in time. A set of 124 troposcatter experiments from Project MALLARD is examined by a specifically developed set of computer routines. Twelve parameters, constants or simple equations, are found representative of all the experiments. An analytical expression for the central statistic used in parameter assignment is developed for the particular modulation system applied in the experiment. For measurable parameter values, it is found to depend only on signal-to-noise ratio and order of diversity. In order to determine the appropriate length of experiment for model building purposes, the experimental variance for the same statistic is developed. It is found to depend on the signal-to-noise ratio, the length of experiment and the RMS fading bandwidth. The entire problem of parameter error development is examined. A conclusion is reached that parameter assignment is practical using computer techniques.

AD-A019 842/4CP PC **A05**/MF **A01**
Air Force Inst of Tech Wright-Patterson AFB Ohio School of Engineering
Speech Synthesis by a Programmable Digital Filter
Master's thesis
Donald B. Warmuth. Dec 75, 78p Rept no. GE/EE/75-41

Descriptors: *Speech recognition, *Computer applications, Phonemes, Synthesis, Sound pitch, Theses, Digital filters, Computer programs, Transfer functions.
Identifiers: PDP-11 computers.

An automatic technique was developed to produce recognizable speech from a string of phonetic characters input from a teletype. The technique is based on modeling the acoustical consequences of the various configurations of the vocal tract. The scheme was tested by acoustical feedback (i.e. listening to it) and by the use of the Speech Analysis System developed by the Aerospace Medical Research Laboratory. The Speech Analysis System consists of an analyzer and associated equipment necessary to produce a real-time hardcopy representation of the frequency characteristics of the speech input. The analyzer itself is called a COC filter and its design is based on the hydro-mechanical operation of the inner ear.

AD-A019 964/6CP PC **A14**/MF **A01**
Input Output Computer Services Inc Cambridge Mass
Software for an Experimental Air-Ground Data Link. Volume III. Program Listings
Final rept. Aug 74-Jul 75
C. J. Goodrow, and E. Rachlis. Oct 75, 313p TSC-FAA-75-21-3
Contract DOT-TSC-887-3
See also Volume 2, AD-A019 646 and Volume 1, AD-A019 645.

Descriptors: *Data links, Air traffic control systems, Very high frequency, Computer applications, Computer programs.
Identifiers: DOT/4IZ/ID, DOT/4HZ/HD.

The listings manual contained in Volume III is intended for use of programmer personnel to serve as a reference source for the Data-Link programs. It is intended as a complement to the Functional Description and Flowcharts (Volume I) and to the System Operation Manual (Volume II). The following ten programs are contained in this manual: (1) Ground Station Communications Supervisor Modules; (2) Airborne Station Communications Supervisor Modules; (3) System Interrupt and I/O Processing Modules; (4) Ground Station Dialogue and Initialization Module; (5) Data Reduction and Analysis Modules; (6) Graph Data Reduction and Analysis Modules; (7) Load Map of Ground Station System; (8) Load Map of Airborne Station System; (9) Load Map of Data Reduction and Analysis System; and (10) Load Map of Graph Data Reduction and Analysis System.

AD-A020 156/6CP PC **A04**/MF **A01**
Army Mobility Equipment Research and Development Center Fort Belvoir Va
Method of Optimization of a Periodic Step Waveform for Minimization of Total Harmonic Distortion
Rept. for May 74-Feb 75
Razi A. Kokan. Jun 75, 57p Rept no. USAMERDC-2148

Descriptors: *Computer programs, *Waveforms, *Inverter circuits, *Harmonic generators, *Rectifiers, Distortion, FORTRAN, Iterations, Numerical analysis, Algorithms, Optimization, Programming languages, Switching circuits, Wave functions, Voltage.
Identifiers: CDC 6600 computers, Electronic inverters, Convergence, FORTRAN 4 programming language, Constraints.

A method of optimization of a function of n variables under a constraint is developed. This method is applied to the optimization of N step voltage heights and the step width X in degrees (all step widths are equal) of a periodic step waveform so that the total harmonic distortion is minimized. Numerical techniuqes are used, and iterative algorithms are developed and implemented by a computer program, written in FORTRAN IV, for the USAMERDC CDC 6600 computer. Step waveforms with 3, 4, and 5 steps have been optimized. The procedure and the results are summarized.

AD-A020 480/0CP PC **A03**/MF **A01**
Bolt Beranek and Newman Inc Cambridge Mass
Interface Message Processors for the ARPA Computer Network
Quarterly technical rept. no. 4, 1 Oct-31 Dec 75.
Frank Heart. Jan 76, 30p Rept no. BBN-3236
Contract F08606-75-C-0032, ARPA Order-2351

Descriptors: *Message processing, *Satellite communications, Digital computers, Input output devices, Networks, Interfaces, Maintenance, Buffer storage, Computer programs, Addressing.
Identifiers: Store and forward communications.

The ARPA Computer Network is a packet-switching store-and-forward communications system designed for use by computers and computer terminals. This Quarterly Technical Report briefly describes various aspects of network operation and maintenance, including IMP software modifications to permit more than 63 IMPs on the net and more than 4 Host computers on an IMP, and shipment of the first Private Line Interface to the field; and discusses in some detail the new TIP software to be released shortly, the Packet Satellite Demonstration and Satellite IMP activities, and recent development in Pluribus technology, plus a summary of accomplishments to date in the latter area.

AD-A020 489/1CP PC **A03**/MF **A01**
Culler/Harrison Inc Goleta Calif
Speech Signal Processing Research
Final technical rept. Mar 73-Sep 75
Glen J. Culler, Michael McCammon, James F. McGill, Dale E. Taylor, and Jan M. Vanderford. Dec 75, 31p Rept no. CHi-FIN-101
Contract DAHC15-73-C-0252

Descriptors: *Signal processing, *Speech compression, *Speech transmission, Digital computers, Remote terminals, Computer programs, Interactive graphics, Networks, Algorithms.
Identifiers: *Speech processing.

During this period, Culler/Harrison, Inc. has developed a powerful, versatile signal processing capability for ARPA and utilized this capability to perform significant and diverse signal processing experiments. The contract called for construction, operation and maintenance of the CHI SIGNAL SYSTEM, a combination of equipment and software providing a unique marriage of computing power and on-line interactive control of that power. The system has proved its flexibility and reliability on a broad range of applications encompassing speech compression, on-line control of laboratory experiments, test editing and controlled thermonuclear reactor simulation. An on-line Interactive Math System was developed and implemented on the CHI SIGNAL SYSTEM under this contract. As a research tool, the SIGNAL Interactive Math System offers researchers the ability to develop sophisticated signal processing processes, to try out new approaches and receive numerical and graphical feedback on-line interactively, and all with button push turn-around time. The Interactive Math System has been retrofitted to an identical CHI SIGNAL SYSTEM which is playing an integral part in the ARPA Research Center, or ARC, located at Moffett Field, California.

AD-A020 493/3CP PC **A08**/MF **A01**
Harry Diamond Labs Adelphi Md
Signal Analysis and Parametrization for EMP Data
Technical rept.
Thomas A. Tumolillo. Sep 75, 163p Rept no. HDL-TR-1715

Descriptors: *Signal processing, *Electromagnetic pulses, *Time series analysis, *Data reduction, Communications networks, Weapon systems, Electromagnetic shielding, Fourier transformation, Walsh functions, Computer programs, Power spectra, Curve fitting, FORTRAN.
Identifiers: Fast Fourier transform, Fast Walsh transform, PREMPT computer program, IBM 370/190 computers, CDC 6500 computers, Military communication.

Presented are the theoretical background, program description, and computer listings that describe the techniques to reduce and analyze digital time-series data obtained in electromagnetic-pulse testing of military communications systems. The topics treated include data preprocessing, digital filtering, fast Fourier transform, fast Walsh transform, refined spectral densities, autocorrelation functions, waveform representation by parametrized functions, and nonlinear, least squares techniques. Several examples of the data are analyzed and discussed.

AD-A020 642/5CP PC **A04**/MF **A01**
Naval Electronics Lab Center San Diego Calif
Effective Ionospheric Height for a Simplified Mode Conversion Model at VLF
Interim rept.
Richard A. Pappert, and Linda R. Shockey. 1 Nov 75, 68p Rept no. NELC/IR-761

Descriptors: *Ionospheric propagation, *Communication and radio systems, Very low frequency, Ionospheric models, Waveguides, Conversion, Low frequency, Height finding, Transmitter receivers, Dipole moments, Electric fields, Computer programs, Computations.

This report generalizes an earlier program for calculating the effects on signal level of mode conversion at VLF/LF frequencies in the earth-ionosphere waveguide. The generalizations are (1) horizontal inhomogeneities are allowed to pass over the transmitter; and (2) the height parameter above which the height gains are discarded and below which the height gains are replaced by a linear combination of Airy functions is allowed to vary from slab to slab. Several methods of selecting the height parameters are examined. Although no one method appears to be superior, the reference height defined by Wait in his studies of exponential profiles, because of ease of implementation, is the preferred method. The present program will yield generalized mode conversion coefficients and a mode sum plot for ground based vertical electric dipole excitation of the vertical electric field at the ground as a function of transmitter-receiver distance or as a function of location of the horizontal inhomogeneity relative to the transmitter for fixed point transmissions.

AD-A020 742/3CP PC **A07**/MF **A01**
Naval Underwater Systems Center New London Conn New London Lab
Preliminary Reference Manual for Program STAMP (STatistics of Acoustic Measurements and Predictions)
Technical document
George Botseas, and John Skory. 2 Feb 76, 139p Rept no. NUSC-TD-5259

Descriptors: *Acoustic data, *Statistical analysis, *Computer programs, Subroutines, Instruction manuals, Acoustic measurement, Mathematical prediction, Sonar sound analyzers, Communication and radio systems, Underwater, Statistical tests, Statistical distributions, Linear regression analyses, Analysis of variance, Parametric analysis, Nonparametric statistics, Digital computers.
Identifiers: *STAMP computer program, Univac 1108 computers, Stationarity.

STAMP (STatistics of Acoustic Measurements and Predictions) is a UNIVAC 1108 program which performs statistical analysis of series data for sonar and communications systems applications. The statistical tests are especially chosen and tailored for requirements of acoustic data analysis. Data such as propagation loss at equal or unequal intervals of range, time, or depth and in any format are suitable for input into the STAMP program. The scope of statistical analysis covers one and two dimensional analysis of variance and linear regression analysis with identification and removal of significant polynomial components of variance (trends). Both parametric and non-parametric analyses are employed to describe the statistical characteristics of the basic data set and to make confidence and reliability statements about (1) individuals of a distribution, (2) means, and (3) variances. Statistics related to the amplitudes by which a given threshold is exceeded and the intervals for which it is exceeded are also calculable by the STAMP program. Stationarity of means, variances, and distributions are a basic type of analysis. Although the program's emphasis is on statistics, STAMP includes a variety of other general-purpose functions that extend its processing capabilities.

AD-A020 994/0CP PC **E03**/MF **A01**
Mitre Corp Bedford Mass
Intensified Silicon Diode-Array Target TV-Camera Tube (EBSICON); Description and Mathematical Model
Technical rept.
K. F. Muller, and G. O. Sauermann. Jan 76, 129
MTR-3073, ESD-TR-75-362
Contract F19628-76-C-0001

Descriptors: *Camera tubes, Electron tube targets, Vidicons, Silicon, Semiconductor diodes, Image intensification, Mathematical models, Computer programs, Gain, Optical images, Storage, Arrays, Space surveillance systems.
Identifiers: Electron beam semiconductor devices, GEODSS system.

In the document the mechanical configuration and the electrical operation of a low light level TV scanning image tube which incorporates high optical gain and image storage is described. The physical phenomena associated with these properties are described. From analytical descriptions of the phenomena, a mathematical model is developed. The computer program implementations of the model provide economical tools for overall system design considerations. These implementations of the model are flexible enough to encompass all sensor tube characteristics and their operating modes conceivable at this time. Where sufficiently accurate tube and operating parameters were available, comparisons of the model performance with experimental data showed very good quantitative agreement.

AD-A021 233/2CP PC **A04**/MF **A01**
Rome Air Development Center Griffiss AFB N Y
Advanced VLF/LF Receive System Developed under the Tri Service Propagation Program
Wayne Bonser. Jan 76, 67p Rept no. RADC-TR-75-284

Descriptors: *Radio reception, Very low frequency, Low frequency, Computer applications, Minicomputers, Computer programs, Interfaces, Signal processing, Radio receivers.

The report describes the advances made in VLF/LF reception and analysis with the application of a computer-controlled narrowband receive system (HP 3040A). It also describes the techniques used and the difficulties encountered during the design and fabrication of an interface to interconnect a Hewlett-Packard (HP) Network Analyzer to a Data General Nova 1200 Minicomputer. The HP 3040A Network Analysis System was specifically designed to operate remotely with slower, more tolerant devices than a computer. The recommended remotely controlling devices are an HP 3260A Marked Card Programmer for input and a Teletypewriter for direct output. The software driver programs to direct the Nova/Analyzer interface and the new System's performance data are also discussed.

AD-A021 262/1CP PC **A21**/MF **A01**
Rand Corp Santa Monica Calif
The ECSS II Language for Simulating Computer Systems
Interim rept.
Donald W. Kosy. Dec 75, 486p Rept no. R-1895-GSA
Contract GS-00C-50020
Report on Extendable Computer System Simulator II.

Descriptors: *Computerized simulation, *Systems analysis, *Computer programming, *Communications networks, Mathematical models, Memory devices, Compilers, Monitors.
Identifiers: *Computer networks, *ECSS 2 programming language, SIMSCRIPT 2 programming language, Computer performance evaluation, Text editors.

ECSS 2 is a specialized programming language for constructing simulation models of computer-based systems. It provides a rich variety of statements and data-structures for describing common computer hardware configurations, software operations, and workload characteristics in a natural and straightforward notation. It has been implemented as an extension of the general-purpose simulation language SIMSCRIPT 2, and that language is included as a subset. This report is a tutorial manual describing ECSS 2 and how it is used to build simulation models. It is divided into four parts. Part I contains a brief introductory chapter discussing the use of simulation in analyzing computer systems and some of the key features of ECSS 2 that assist in that process. Parts II, III, and IV describe the language constructs in successively greater levels of detail.

AD-A021 610/1CP PC **A02**/MF **A01**
Wharton School of Finance and Commerce Philadelphia Pa Dept of Decision Sciences (Management)
Optimizing Distributed Data Bases -- a Framework for Research
Final rept.
K. Dan Levin, and Howard Lee Morgan. 1974, 10p Rept no. 75-01-07
Contract N00014-75-C-0462, N00014-67-A-0216-0007
Availability: Pub. in AFIPS Conference Proceedings, v44 p473-478 1975.

Descriptors: *Data bases, *Data management, *Computer files, *Interequipment communication, Computer programs, Three dimensional, Nonlinear programming, Optimization, Access, Allocations, Costs, Reprints.
Identifiers: *Distributed data base, *Computer networks, *Computer communications.

This paper provides a framework in which to view the problem of optimizing distributed data bases. Having reviewed existing file location models, a distinction between data sharing and program and data sharing was established. A three dimensional partitioning of the file location problem is employed as the framework for the main body of this research. First, a file location model which consideres the dependencies between program and data files is studied. The problem is formulated as a zero-one non-linear programming problem under the assumptions that access request patterns are static over time and known with certainty. Second, the assumption that the access request patterns are static over time is relaxed and a dynamic model which considers transition costs is suggested. Third and final, the situation in which access request patterns are unknown initially is examined. A statistical procedure for the estimation of these patterns is developed for both stationary and nonstationary situations. This is incorporated in the file location model and used as a basis for adaptive reassignment of files in the network. (Author)

AD-A021 818/0CP PC **A05**/MF **A01**
Naval Postgraduate School Monterey Calif
Application of the Computer for Real Time Encoding and Decoding of Cyclic Block Codes
Master's thesis
Nizamettin Cetinyilmaz. Dec 75, 85p

Descriptors: *Error correction codes, *Computer programs, *Decoding, *Pulse communications, Decoders, Pseudo noise systems, Probability, Real time, Flow charting, Shift registers, Channels, Feedback, Theses, Digital systems.
Identifiers: Cyclic block codes.

This thesis is concerned with cyclic block codes which can be used for the detection and correction of errors in a transmitted message which are produced by various types of noise. Computer programs were developed and used for the actual encoding and decoding process. Advantages of using the computer as against using various types of dedicated hardware is demonstrated. Two different methods of decoding are presented: the minimum distance decoder and the syndrome method decoder. Pseudo random noise sequences were also generated by computer program and used to simulate noise disturbance of the encoded transmitted message. Codes of several rates and with varying degrees of simulate channel noise were studied and compared with respect to the probability of error. It is shown how the methods developed in this thesis can materially help in choosing the 'best' code for a given noisy channel, consonant with other specified parameters for message transmission. (Author)

AD-A021 929/5CP PC **A06**/MF **A01**
Naval Research Lab Washington D C
Automatic Translation of English Text to Phonetics by Means of Letter-to-Sound Rules
Interim rept.
Honey Sue Elovitz, Rodney W. Johnson, Astrid McHugh, and John E. Shore. 21 Jan 76, 101p
Rept no. NRL-7948

Descriptors: *Computer applications, *Speech recognition, Synthesis, Phonetics, Reading machines, Computer programming.
Identifiers: TRANS computer program, DICT computer program, FASBOL computer program, SNOBOL programming language.

Speech synthesizers for computer voice output are most useful when not restricted to a prestored vocabulary. The simplest approach to unrestricted text-to-speech translation uses a small set of letter-to-sound rules, each specifying a pronunciation for one or more letters in some context. Unless this approach yields sufficient intelligibility, routine addition of text-to-speech translation to computer systems in unlikely, since more elaborate approaches embodying large pronunciation dictionaries or linguistic analysis require too much of the available computing resources. The work described here demonstrates the practicality of routine text-to-speech translation. A set of 329 letter-to-sound rules has been developed. These translate English text into the International Phonetic Alphabet (IPA), producing correct pronunciations for approximately 90% of the words in an average text sample. Most of the remaining 10% have single errors easily correctable by the listener. Another set of rules translates IPA into the phonetic coding for a particular commercial speech synthesizer. This report describes the technical approach used and the support hardware and software developed. It gives overall performance figures, detailed statistics showing the importance of each rule, and listings of a translation program and a program used in rule development.

AD-A021 940/2CP PC **A02**/MF **A01**
Defense Communications Engineering Center Reston Va
A Unified Approach to Modelling Loop Service Systems: A Preliminary Report
Technical note
M. Fischer. Dec 75, 20p Rept no. TN-41-75

Descriptors: *Central processing units, *Communications networks, *Queueing theory, Mathematical models, Approximation, Analysis of variance.
Identifiers: M/G/1 queue.

Loop service systems are used as a model to predict the performance of such telecommunication systems as multidrop lines, concentrators and various satellites systems. Available results for different configurations are often based on different assumptions and so direct comparisons can not be made. This report presents a unified method of analyzing such congestion systems.

AD-A022 141/6CP PC **A02**/MF **A01**
California State Univ San Jose Dept of Speech-Communication
PROXVAL Program Description
Technical rept.
Kenneth K. Kirste, and Peter R. Monge. Dec 75, 24p Rept no. TR-5
Contract N00014-75-C-0445

Descriptors: *Computer programs, *Networks, *Communication equipment, Errors, Digital computers, Magnetic disks, FORTRAN, Probability, Computer files, Punched cards.
Identifiers: PROXVAL computer program, FORTRAN 4 programming language, IBM 360 computers.

This report describes five computer programs written to augment the network analysis of communication patterns within a complex organization provided by NEGOPY. All are written in FORTRAN IV and are designed for execution under a disc-based IBM 360/70 operating system. The five are: PROXVAL, EXTENDB, EXTENDA, COMCUM, and CONVERT. PROXVAL calculates the proximity of individuals within the organization providing a value which represents one individual's physical relationship to all others and providing proximity for all combinations of pairs of individuals. Program EXTENDB combines PROXVAL calculations of an individual's proximity to all others. Up to 99 PROXVAL runs can be combined (3,564 locations). Program EXTENDA combines PROXVAL calculations of the proximity of every pair (up to 99 PROXVAL runs). Program COMCUM totals each individual's reported communication, providing a listing of the total amount of communication each engages in. Program CONVERT was introduced to convert data collected from specific channels to total communication data.

AD-A022 380/0CP PC **A03**/MF **A01**
Bolt Beranek and Newman Inc Cambridge Mass
Distributed Computation and TENEX-Related Activities
Quarterly progress rept. 1 Nov-30 Jan 76
J. Burchfiel, R. Thomas, T. Myer, and R. Tomlinson. Feb 76, 29p Rept no. BBN-3257
Contract N00014-75-C-0773, ARPA Order-2935

Descriptors: *Computer program documentation, *Information theory, *Message processing, Communication terminals, Computations, Modes, Data processing, Interfaces, Coding, Computer files, Global.
Identifiers: *Computer software, Distributed computations.

This report describes BBN efforts in the design of the National Software Works system and BBN efforts to integrate TENEX into the National Software Works System. It also describes BBN efforts to upgrade existing ARPANET message service to meet Navy requirements for an interactive message processing test at CINCPAC. (Author)

AD-A022 589/6CP PC **A24**/MF **A01**
Culler/Harrison Inc Goleta Calif
Speech Signal Processing Research. Appendices 1 thru 9
Final technical rept. Mar 73-Sep 75
Glen J. Culler. Dec 75, 568p
Contract DAHC15-73-C-0252, ARPA Order-2359
See also AD-A020 489.

Descriptors: *Signal processing, *Speech compression, *Speech transmission, Speech analysis, Macroprogramming, Computer program documentation, Programming manuals, Specifications, Subroutines.
Identifiers: *Speech processing, Computer software.

Contents: TMB2-MP-32A macroprocessor refference manual; TMB8-AP-90 reference manual; TMB7-The ver distant host (VDH connection for the MP-32 reference manual; Specifications of analog input/output capability for serial 2 MP; Software A2- User manual; TMA9-System operation manual for SN2; TMA3-Software MP-32 macroprogramming; TMA4-Software MP-32 microprogramming manual; and TMA8-Software AP-90 programming manual manual.

AD-A023 197/7CP PC **A04**/MF **A01**
Stanford Research Inst Menlo Park Calif
Modeling of Transionospheric Radio Propagation
Final technical rept. May 74-May 75
E. J. Fremouw, and C. L. Rino. Feb 76, 58p
RADC-TR-76-35
Contract F30602-74-C-0279, ARPA Order-2777

Descriptors: *Radio transmission, *Ionospheric propagation, *Scintillation, Radio waves, Electromagnetic scattering, Mathematical models, Computer programs, Ionospheric models.
Identifiers: *Transionospheric propagation.

This is the final quarterly technical report on a one-year contract to extend and improve an existing empirical model for worldwide behavior of ionospherically imposed radio-wave scintillation. The objectives of the project were (1) to improve the accuracy of model-based calculations of the intensity-scintillation index and (2) to develop a capability for full description (from the point of view of engineering applications) of the first-order, complex-signal statistics that characterize the transionospheric radio communication channel. The stated objectives of the just-completed project were accomplished by starting with the scintillation model developed by Fremouw and Rino (1973), adding a geomagnetic-activity dependence for the behavior of scintillation-producing ionospheric irregularities, and substituting a more accurate and general scattering theory for that of Briggs and Parkin (1963) used in the earlier model. The results of these efforts have been implemented in two computer programs. The first, entitled RFMOD, contains the main elements of the scattering theory, the morphological model for ionospheric irregularity strength and other parameters, and subroutines for calculating the geometry and other relevant quantities from user-specified inputs.

AD-A023 692/7CP PC **A04**/MF **A01**
Mitre Corp Bedford Mass
Communications Processors: Categories, Applications, and Trends
Technical rept.
K. T. Mahoney. Mar 76, 57p MTR-3102, ESD-TR-75-371
Contract F19628-75-C-0001

Descriptors: *Computer communications, *Front end processors, Networks, Message processing, High level languages, Data links, Minicomputers, Microcomputers, Microprocessors, Computer program documentation, Military applications, Information processing.
Identifiers: Computer networks, Computer software.

Communication processor applications are expanding as the trend continues towards distributed processing in information systems. This report identifies and describes the major categories of communications processors. As an example of current applications, the use of communications processors within existing systems is detailed. The potential impact of emerging technologies on the design and use of communications processors is discussed. Tradeoffs and guidelines in selecting a device for a specific application are included, with manufacturer models presented as illustrations. (Author)

AD-A024 670/2CP PC **A09**/MF **A01**
Usc/Information Sciences Inst Marina Del Rey Calif
Distributed Computation Study
Final technical rept. May-Nov 75
Stephen R. Kimbleton, and Richard L. Mandell. Apr 76, 191p RADC-TR-76-108
Contract F30602-75-C-0222

Descriptors: *Computers, *Computer communications, *Communications networks, *Computations, Computer programs, Programming languages, Data processing, Networks, User needs, Access, Packets, Computer files, Circuit interconnections.
Identifiers: *Computer networks, *Distribution computations, Network operating system, Distributed processing, Distributed systems, *Computer networks, *Operating systems(Computers).

Efficient access and utilization of a collection of computer systems interconnected by a communications network requires development of a Network Operating System (NOS). By definition, an NOS, in analogy with a host operating system is intended to provide ease of user access to the collection of resources comprising the network and to support allocation of resources among multiple competing requests. This report summarizes the results of a study directed toward: Identification of NOS objectives, Determination of constraints implicit in achieving these objectives, Description of an approach for NOS development. (Author)

AD-A024 819/5CP PC **A02**/MF **A01**
Stanford Univ Calif Digital Systems Lab
ARPA Internetwork Protocols Project Status Report
Technical note
Vinton G. Cerf. 15 Nov 75, 25p Rept no. TN-68
Contract MDA903-76-C-0093, ARPA Order-2494

Descriptors: *Communications networks, *Packets, *Radio links, Computer programs, Communication terminals, Computer program documentation, Data processing terminals, Performance(Engineering), Interfaces.
Identifiers: *TCP(Transmission control program), *Transmission control program, *Packet radio networks, Computer software, Throughput, Communication protocols, *ARPA computer network, *Computer networks, *Protocols.

An Internetwork Communication Protocol was implemented which permits reliable interprocess communication to be established between hosts in different networks. Estimates of program size are made for a single connection version of the program for use in a mobile packet radio terminal. Preliminary throughput measurements indicate serious problems with the Very Distant Host interface and its related software. A plan for detailed analysis of delays in the system has been made and the results will be reported during the next quarter.

AD-A024 820/3CP PC **A03**/MF **A01**
Stanford Univ Calif Digital Systems Lab
Single-Connection TCP Specification (Preliminary Documentation)
Technical note
James E. Mathis. 25 Jan 76, 30p Rept no. TN-75
Contract MDA903-76-C-0093, ARPA Order-2494

Descriptors: *Communications networks, *Packets, *Radio links, *Circuit interconnections, Communications traffic, Computer programs, Delay, Interfaces, Variables, Specifications.
Identifiers: *TCP(Transmission Control Program), *Transmission Control Program, *Packet radio networks, Throughput, Algol programming language, Data structures, Computer networks, Communication protocols, Dedicated computers, *ARPA computer network, *Computer networks, *Protocols.

An implementation scheme is described for a single connection, user internetwork Transmission Control Program using the Cerf-Kahn protocol. It is designed for a dedicated micro-processor and supports low delay, low through-put interactive traffic. In this preliminary documentation a detailed implementation specification is presented in an ALGOL-like notation, along with a brief discussion of its functions, user interface, control variables and data structures. (Author)

AD-A024 821/1CP PC **A02**/MF **A01**
Stanford Univ Calif Digital Systems Lab
TELNET under Single-Connection TCP Specification
Technical note
Darryl E. Rubin. 2 Feb 76, 17p Rept no. TN-76
Contract MDA903-76-C-0093, ARPA Order-2494

Descriptors: *Communications networks, *Packets, *Radio links, *Microprocessors, *Communication terminals, *Circuit interconnections, Computer programs, Programming languages, Interfaces, Specifications.
Identifiers: *TCP(Transmission control program), *Transmission control program, ALGOL programming language, *Packet radio networks, Data structures, ALGOL programming language, Communication protocols, *ARPA computer network, *Computer networks, *Protocols.

The necessary functions of a user-TELNET to run under TCPO on a microprocessor (as in a mobile packet radio terminal) are described. A detailed implementation specification for the mini-TELNET is presented in an ALGOL-like notation, along with a discussion of its user interface, and control and data structures. (Author)

AD-A024 822/9CP PC **A02**/MF **A01**
Stanford Univ Calif Digital Systems Lab
TCP Resynchronization
Technical note
Vinton G. Cerf. 11 Jan 76, 12p Rept no. TN-79
Contract MDA903-76-C-0093, ARPA Order-2494

Descriptors: *Communications networks, *Packets, *Radio links, *Synchronization(Electronics), *Computer communications, Sequences, Detection, Duplexers, Computer programs.
Identifiers: *TCP(Transmission control program), *Transmission control program, *Packet radio networks, *Resynchronization, Duplicate detection, Communication protocols, *ARPA computer network, *Computer networks, *Protocols.

This note elaborates the notion of duplicate detection through sequencing and the need for resynchronizing the sequence numbers in use on a full duplex connection uder certain conditions. (Author)

AD-A024 823/7CP PC **A04**/MF **A01**
Stanford Univ Calif Digital Systems Lab
ARPA Internetwork Protocols Project Status Report
Technical note, 15 Nov 75-15 Feb 76
Vinton G. Cerf. 15 Feb 76, 53p Rept no. TN-83
Contract MDA903-76-C-0093, ARPA Order-2494

Descriptors: *Communications networks, *Radio links, *Packets, Computer communications, Synchronization(Electronics), Digital systems, Digital computers, Computer programs, Interfaces, Integrated circuits.
Identifiers: *TCP(Transmission control program), *Transmission control program, *Packet radio networks, Throughput, Communication protocols, Resynchronization, Large scale integration, *ARPA computer network, *Computer networks, *Protocols.

This quarterly report summarizes changes in the TCP specification, measurement of VDH overhead, plans for the single connection TCP/TELNET, and mentions the development of a very small LSI-11 interface to the BBN IMP. (Author)

AD-A024 831/0CP PC **A03**/MF **A01**
Naval Research Lab Washington D C
Intermodulation Considerations for the GAPFILLER Satellite
Final rept.
Arthur J. Ziffer, and Cecil J. Waylan. Apr 76, 29p Rept no. NRL-MR-3271

Descriptors: *Intermodulation, *Communication satellites, Ultrahigh frequency, Satellite communications, Frequency allocation, Broadband, Radiofrequency interference, Electromagnetic compatibility, Degradation, Computer programs, Methodology.
Identifiers: GAPFILLER satellites, MARISAT satellites.

The Navy intends to lease the UHF portion of the MARISAT Satellite system. This portion of the MARISAT, referred to by the Navy as GAPFILLER, consists of a wideband (500 kHz) and two narrowband (25 kHz) translating, hardlimiting, repeating channels. The current intent of the Navy is to utilize the wideband channel as 19 adjacent 25 kHz accesses. Because of nonlinear elements in the transmit chain of the satellites, multiple signal use creates intermodulation products in the transmitted spectrum. Some of these signals, although attenuated by filtering and antennae isolation, fall into the receive channel band. Because of the low power level of the desired signals to be received, these intermodulation products can cause serious degradation to satellite performance if not adequately suppressed. In addition to careful engineering and spacecraft design, frequency choice plays a significant role in determining the potential impact of intermodulation products on satellite operation. Since the frequency plan and operating access frequencies for GAPFILLER have been determined, it is the intent of this report to determine the order in which accesses should be eliminated from the satellite to decrease degradation of operation due to intermodulation product effects.

AD-A025 094/4CP PC **A10**/MF **A01**
Carnegie-Mellon Univ Pittsburgh Pa Dept of Computer Science

Segmentation and Labeling of Speech: A Comparative Performance Evaluation
Interim rept.
Henry Gilbert Goldberg. Dec 75, 214p AFOSR-TR-76-0604
Contract F44620-73-C-0074, ARPA Order-2466
Doctoral thesis.

Descriptors: *Speech recognition, *Signal processing, *Speech, Parametric analysis, Acoustic signals, Information theory, Computer programs, Classification, Segmented, Labels, Transformations(Mathematics), Symbols, Mathematical filters, Phonetics, Patterns, Algorithms, Matching, Templates, Theses.

This thesis studies speech recognition at the parametric level. It attempts to evaluate and understand the relative merits of a number of alternative design choices at that level. In particular, it involves an investigation of segmentation and labeling techniques, and the use of parametric representations for the acoustic signal. Every speech recognition system employs some parametric representation and some initial signal to symbol transformation. The author shows the performance currently available for these initial processes, and asserts that such performance is comparable to human performance. After presenting the relative merits of some typical parametric representations, we develop a methodology for such comparative evaluation. Simple, parameter-independent schemes for segmenting, labeling, and training are also developed. The role of pattern classification techniques is clarified, as it relates to the initial signal to symbol transformation. Four parametric representations were chosen for study: a set of amplitudes and zero-crossing measurements from 5 octave filters; a set of energy measurements from a 1/3 octave filter bank; a smoothed, short-time spectrum computed from the LPC filter and the LPC coefficients themselves. Note that the first two involve the use of analog devices. Each method yields a set of measurements at uniform, short intervals--a pattern. Distance functions, chosen from pattern classification theory, are then applied to the parameter patterns as measures of acoustic similarity.

AD-A025 159/5CP PC **A04**/MF **A01**
Carnegie-Mellon Univ Pittsburgh Pa Dept of Computer Science
Parallelism in AI Problem Solving: A Case Study of Hearsay II
Interim rept.
R. D. Fennell, and V. R. Lesser. Oct 75, 52p AFOSR-TR-76-0598
Contract F44620-73-C-0074, ARPA Order-2466

Descriptors: *Parallel processing, *Multiprocessors, *Speech recognition, Problem solving, Data processing, Computerized simulation, Computer programs, Policies.
Identifiers: Hearsay system, Hearsay 2 system.

The Hearsay II speech-understanding system (HSII) (Lesser, et al., 1974; Fennell, 1975; Erman and Lesser, 1975) is an implementation of a knowledge-based multiprocessing AI problem-solving organization. HSII is intended to represent a problem-solving organization which is applicable for implementation in a multiprocessing environment, and is, in particular, currently being implemented on the C.mmp multiprocessor system (Bell, et al., 1971) at Carnegie-Mellon University. The object of this paper is to explore several of the ramifications of such a problem-solving organization by examining the mechanisms and policies underlying HSII which are necessary for supporting its organization as a multiprocessing problem-solving system. First, an abstract description of a class of problem-solving systems is given using the Production System model of Newell (1973). Then, the HSII problem-solving organization is described in terms of this model. The various decisions made during the course of design necessitated the introduction of various multiprocessing mechanisms (e.g., mechanisms for maintaining data localization and data integrity), and these mechanisms are discussed. Finally, a simulation study is presented which details the effects of actually implementing such a problem-solving organization for use in a particular application area, that of speech understanding. (Author)

AD-A025 358/3CP PC **A06**/MF **A01**
Bolt Beranek and Newman Inc Cambridge Mass
The Interface Message Processor Program
Jun 76, 124p Rept no. Technical Information-89
Contract DAHC15-69-C-0179, F08606-75-C-0032
Revision of report dated Feb 73. Supersedes report dated May 76, AD-A025 308.

Descriptors: *Computer communications, *Communications networks, *Message processing, *Computer programs, Interfaces, Packets, Core storage, Communication satellites, Retransmission, Maps, Routing, Communications traffic, Communication switching centers.
Identifiers: *ARPA computer network, *Interface message processors.

The ARPA Network has been in operation for over five years and has become an international facility. The network has grown to almost sixty sites spread across the continental United States, plus satellite connections to Hawaii, Norway, and England, and is steadily growing; approximately one hundred independent computer systems of varying manufacture are interconnected. Provisions has been made for terminal access to the network from sites which do not enjoy the ownership of an independent computer system. Implementation of the IMPs required the development of a sophisticated computer program. As stated then, the principal function of the IMP program is the processing of packets, including the following: segmentation of Host messages into packets; receiving; routing, and transmitting store-and-forward packets; retransmitting unacknowledged packets; reassembling packets into messages for transmission into a Host; and generating RFNMs and other control messages. The program also monitors network status, gathers statistics, and performs on-line testing.

AD-A025 956/4CP PC **A02**/MF **A01**
Bolt Beranek and Newman Inc Cambridge Mass
Distributed Computation and TENEX-Related Activities
Quarterly progress rept. no. 6, 1 Feb-30 Apr 76
R. Schantz, and R. Thomas. Jun 76, 18p Rept no. BBN-3315
Contract N00014-75-C-0773, ARPA Order-2901

Descriptors: *Computer programs, *Computer program documentation, Microprogramming, Computer communications, Computer files, Department of Defense, Machine coding, Data bases, Message processing, Communications networks.
Identifiers: *TENEX Computer Program, *Computer software, Distributed computation, TENEX system, *Computer networks.

This report describes BBN efforts in the design of the National Software Works system and BBN efforts to integrate TENEX into the National Software Works system. (Author)

AD-A026 409/3CP PC **A07**/MF **A01**
Georgia Inst of Tech Atlanta Electronics Technology Lab
Interactive Communication Systems Modeling Study
Interim technical rept. 12 Jun-12 Nov 75
Richard W. Moss, Joe L. Hammond, and Ernest E. Donaldson. May 76, 139p RADC-TR-76-155
Contract F30602-75-C-0247

Descriptors: *Communication equipment, *Computerized simulation, *Man machine systems, Interactions, Computer graphics, Time domain, Models, Computer programming, Display systems.
Identifiers: *Digital communications, Flexibility.

This interim report deals with the initial activities under an effort to develop an interactive computer model for analysis and design of digital communications systems. In this report concepts are formulated and described for a model for Interactive Design and Analysis of Communication Systems (MIDACS). Methods of approach for concept formulation are described, examples of previous modeling approaches are presented, and characteristics of the MIDACS concept are documented. Various interactive approaches are shown along with general hardware and software requirements. The formulated interactive concept includes the computer, display devices, and other input/output devices. Mathematical modeling approaches are described including standard Monte Carlo techniques, deterministic methods, and analytical models. The recommended modeling structure includes a modified Monte Carlo technique to minimize computer time for certain communication system performance measures. A multi-level analysis structure is proposed which includes a hierachy for the physical model combined with a hierarchy of analysis levels which permits greatest computer use flexibility. (Author)

AD-A026 847/4CP PC **A05**/MF **A01**
Speech Communications Research Lab Inc Santa Barbara Calif
Inverse Filter Parameters for Speaker Identification
Final technical rept. 22 Apr 74-21 Apr 75
Larry L. Pfeifer. Jun 76, 79p RADC-TR-76-171
Contract F30602-74-C-0248

Descriptors: *Speech recognition, *Video filters, Vocoders, Vowels, Coefficients, Semantics, Sampling, Speech analysis, Sound waves, Parameters, Reflection, Word recognition, Spectrum signatures, Data bases, Standard deviation, Computer programs.
Identifiers: Cepstral coefficients, Euclidean distance.

The capability to perform text-independent speaker identification is desirable because in many practical situations the text of a speech sample being tested will not be the same as the the text from which information was initially gathered about the speaker. The method of comparing feature vectors from individual sound units, usually vowels, has been studied as one possible approach to the problem. This report deals with an evaluation of three different types of parameters which are obtainable from the inverse filter method of linear prediction, namely the inverse filter coefficients, reflection coefficients, and cepstral coefficients. Using 821 samples of the vowel epsilon (as in the word bed) from 16 speakers a series of speaker identification experiment was performed using a Euclidean distance measure and a weighted Euclidean distance measure. Results showed that independent of the kind of experiment, or the distance measure, the cepstral coefficients and reflection coefficients had similar error rates and the errors were consistently lower than with inverse filter coefficients. It also demonstrated that these low-dimensional coefficient vectors can classify speakers nearly as well as spectral vectors which have a larger number of vector elements. The cepstral coefficients are of particular interest because they are linearly related to the log spectral domain and can be computed from the inverse filter coefficients through a recursive procedure which is computationally more efficient than the classical double FFT procedure.

AD-A027 220/3CP PC **A04**/MF **A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
Computer Software for the Navy K-Band Satellite Communications Terminal
Technical note
Dale A. McNeill. 24 May 76, 51p TN-1976-25, ESD-TR-76-118
Contract F19628-76-C-0002

Descriptors: *Communication satellite terminals, *Computer program documentation, *Computer programs, *Message processing, Satellite tracking systems, K band, downlink, Magnetic tape, Digital computers.
Identifiers: *Computer software, Autotracking, Les-8 satellite, Les-9 satellite, IBM 370 computers.

A small general purpose computer is an integral part of the Navy experimental K-band communications terminal to provide the necessary computational power and flexibility. The computer functions include: (1) satellite orbit predictions for antenna tracking, (2) received signal integration and comparison for autotracking, (3) adjustments of transmitter power based on information derived from the downlink signal, (4) message editing and processing, (5) verification of correct terminal setup, and (6) recording of input parameters and performance data on magnetic tape for offline processing. (Author)

AD-A027 298/9CP PC **A04**/MF **A01**
Air Force Weapons Lab Kirtland AFB N Mex
A Digitizing System for 525 Line, 60 Hz, Monochrome Television
Final rept.
Donald C. Anderson. Jun 76, 64p Rept no. AFWL-TR-76-3

Descriptors: *Digitizers, *Video tape recording, *Disk recording systems, Computer programs, Television equipment, Computer program documentation, Analog to digital converters, Flow charting, Minicomputers, Interfaces, Data acquisition, Image processing, Coders.
Identifiers: *Video processing, Computer software, Monochrome television.

A description is given of a video processing system which is capable of digitizing 525 line, 60 Hz, 2:1 interlace, monochrome television. The system digitizes an area of the TV frame which is programmable in size and position from a programmable number of frames. This is achieved by first recording the data interval to be digitized onto an analog video disc recorder and then digitizing from the disc in a piecemeal manner. A 10 MHz sampling reference is used, allowing a maximum of 524 samples per horizontal TV line with each sample being resolved to a 6-bit binary word. Digital values are assigned according to picture brightness at a given sampling point in the raster with reference black being 0 and reference white being 63. Digital output is recorded on seven-track magnetic tape. Normal input to the system is from a video tape recorder, although the system will accept 525 line standard video from any source. For video tape recorder data, time base correction is provided. IRIG time is included with the digital output using the vertical interval encoding technique. The system offers the advantages of good versatility and high processing speed, although positional repeatability is limited to + or - 1/2 cycle of the reference oscillator. (Author)

AD-A027 365/6CP PC **A05**/MF **A01**
Air Force Inst of Tech Wright-Patterson AFB Ohio School of Engineering
A Preliminary Cost Analysis of the Communications Processor for the F-15 Joint Tactical Information Distribution System
Master's thesis
William Francis Gaumer. Sep 76, 87p Rept no. GSM/SM/76S-8

Descriptors: *Command and control systems, *Communication equipment, *Cost analysis, *Data processing, *Tactical data systems, Cost estimates, Minicomputers, Logistics support, Computer program documentation, Jet fighters, Air Force budgets, Tactical communications, Theses.
Identifiers: *Communication processors, Computer software, F-15 aircraft.

Budget restraints over the past several years have caused the Department of Defense to take a closer look at the new systems that it requires. Emphasis has been placed on not just the initial cost but the entire life cycle of the system. The Air Force has initiated several studies and projects aimed at reducing the total cost of new aircraft avionic systems. This thesis presents a preliminary analysis of the costs involved in acquiring and supporting a communications processor for the F-15 Joint Tactical Information Distribution System terminal. The characteristics of a digital computer are examined from a historical management perspective as well as the enginering design considerations. Two designs are presented: one is based on the current F-15 central computer while the other is based on current microcomputer technology. The software development and hardware procurement costs are estimated for each design, and the cost impact of the designs on several logistic support costs is also discussed. An analysis of these costs indicates that the microcomputer design would be the least costly of the two designs. Lower hardware procurement costs coupled with lower maintenance costs make the microcomputer design most attractive alternate for implementation into the F-15 JTIDS terminal. (Author)

AD-A027 429/0CP PC **A05**/MF **A01**
Cnr Inc Newton Mass
HF Channel Simulation
Final rept. 15 Oct 73-14 Apr 74
Robert W. Pinto, and Phillip A. Bello. 14 May 74, 89p Rept no. CNR-14
Contract N00014-74-C-0048

Descriptors: *Channels, *Information theory, *Radio transmission, Radio links, Pseudo noise systems, Probes(Electromagnetic), Signal processing, Simulation, Simulators, Playback, Computer programs, Multipath transmission, High frequency, Measurement.
Identifiers: *Stored channel simulators, *Time varying channels.

The stored channel simulator is capable of measuring and reproducing a linear time-variant HF channel over a finite bandwidth. Simulator software has been written which performs all required signal processing functions in the four major areas this project encompassed: (1) PN probing; (2) channel measurement; (3) channel playback; (4) simulator verification by means of a deterministic time-varying test channel. Significant attention is given to the effect of channel characteristics on simulator parameter values and software structure. (Author)

AD-A027 643/6CP PC **A05**/MF **A01**
Joint Tactical Communications Office Fort Monmouth N J
Cost Effectiveness Program Plan for Joint Tactical Communications. Volume III. Life Cycle Costing. Appendix F. Computer Models for LCC
May 76, 94p Rept no. TTO-ORT-032-76A-V3-APF
See also AD-A023 223 and AD-A021 938.

Descriptors: *Tactical communications, *Cost effectiveness, *Life cycle costs, Computerized simulation, Computer programs, FORTRAN, Communication equipment, Logistics support, Joint military activities.
Identifiers: FORTRAN 4 programming language.

The appendix describes and documents Life Cycle Costing (LCC) computer models and presents sample life cycle cost calculations using the models. The automated models primarily concentrate on O and S costs; however, complete life cycle costs are computed using as inputs point estimates for R and D and equipment unit production costs. The basic TRI-TAC LCCM is presented with the program as written for a Hewlett-Packard HP-9821A and makes reference to the same model which has been programmed in Fortran IV for use on the Burrough's B5550 Time Sharing System. The User's Guide for the Fortran IV version is included and an expanded version of the LCCM program written for the HP-9821A is also provided.

AD-A028 245/9CP PC **A04**/MF **A01**
Computer Sciences Corp Falls Church Va
Digital Controller Communication Link
Final technical rept. 15 May 74-15 Apr 75
Charles F. Pavey, and James H. Stahler. May 76, 58p CSC-3314-00000, AFAL-TR-76-31
Contract F33615-74-C-1186

Descriptors: *Computer communications, *Communication terminals, *Interequipment communication, *Data links, *Data transmission systems, Computer programs, Flow charting, Asynchronous computers, Subroutines, Error analysis, Simulators, K band, Avionics, Antennas, Fortran, Digital systems, Pulse communications.
Identifiers: Data transfer, Microwave communication.

This report describes the addition of a communication link between the digital controller (PDP 11/20) in the K-Band Terminal Simulator and digital controller (PDP 11/45) used to control the pointing of the roof top antenna. Both digital controllers are intergral parts of the AFAL Communications System Evaluation Laboratory (CSEL). The need for computer to computer communications in support of the Air Force Avionics Laboratory programs arises from the requirement that data such as probability of error, be moved from the K-Band Terminal Simulator's Spectrum and Interference Generator (SIG) digital processor (PDP 11/20) to another computer (PDP 11/45) for processing and that patterns used in simulating real-time effects on communications channels (fade attenuation, for example) be moved to the SIG digital processor for use in real-time simulation.

AD-A028 934/8CP PC **A03**/MF **A01**
Royal Signals and Radar Establishment Christchurch (England)
An Experimental Implementation of a FORMAT D Message Analyser by Syntactic Specification
J. S. Hill. Apr 76, 44p RSRE-76004, DRIC-BR-52596

Descriptors: *Communications traffic, *Message processing, *Telegraph systems, *Formats, *Syntax, *Communication switching centers, *Computer applications, Specifications, Errors, Computer program documentation, Computer programs, Great Britain.
Identifiers: *Message traffic, Computer software.

A syntactic specification has been produced for the military message format FORMAT D. A syntactic specification for the analysis of messages in FORMAT D has been derived from this; the analysis specification permits tolerance of some typing and simple format errors. SEMSID, a syntax analyser generator program, has been used to produce a working message analysis package from the syntax for message analysis. Introductory sections give a background description of syntactic techniques and tools as used for the task. (Author)

AD-A029 225/0CP PC **A04**/MF **A01**
Army Engineer Waterways Experiment Station Vicksburg Miss
NETDEN: An Interactive Network Design Graphics Simulation
Final rept.
Drayton D. Boozer, and Ralph K. Williams. Jul 76, 55p Rept no. WES-MP-K-76-4

Descriptors: *Communications networks, *Computer graphics, *Computer programs, *Data processing terminals, Fortran, Telecommunication, Computer program documentation, Computerized simulation, Maps, Visual aids, Subroutines, Data processing.
Identifiers: *NETDEN computer program, Fortran 4 programming language.

NETDEN is an interactive, network design, graphics simulation which displays one of five network designs for a set of user specified sites superimposed on an outline of the contiguous United States. The available designs are Minimum Mileage Star, Minimum Spanning Tree, Minimum Mileage Fixed Hub(s) Star, Minimum Mileage Ring, and Arbitrary Network. NETDEN is written in Fortran 4 and uses the U. S. Military Academy's Graphics Compatibility System graphics software. This document provides both an overview of NETDEN's capability as well as detailed user information. (Author)

AD-A029 967/7CP PC **A05**/MF **A01**
Yuma Proving Ground Ariz
Instrumentation Development Investigation of Command and Control Console
Final rept.
James N. Mitchell. Jun 76, 80p Rept no. USAYPG-272

Descriptors: *Command and control systems, *Consoles, *Computer applications, Aircraft, Firing tests(Ordnance), Input output devices, Real time, Computer programs, Interactive graphics.

This investigation describes the hardware and operating system for a prototype command and control system for controlling a single aircraft, live-firing test on the U.S. Army Yuma Proving Ground Cibola and Aircraft Armament Ranges. The report also includes the results of a systems analysis which recommended the configuration of the console and general design of the operating system described. This prototype was and continues to be a primary learning vehicle for proving ground range control developments. The primary emphasis was controlling a single test on the Cibola Aircraft Armament Range. Utilization of currently available facilities, rapid implementation, low cost, adaptability to the final system and ease of use by appropriate personnel were further considerations. Aircraft Armament Project officers were interviewed to determine requirements for support of current testing. The hardware for this system was acquired using funds from this instrumentation development project. Software was developed under the above associated Methodology Improvement Investigation.

AD-A030 029/3CP PC **A09**/MF **A01**
Duke Univ Durham N C Adaptive Signal Detection Lab
Relationships Between Detection and Estimation: Scalar and Array Processing
Technical rept.
Sang C. Lee. Jun 76, 176p Rept no. TR-12
Contract N00014-75-C-0191

Descriptors: *Signal processing, Stochastic processes, Bayes theorem, Adaptive systems, White noise, Fast Fourier transforms, Computer programs.
Identifiers: *Signal detection, *Estimation theory, Sensitivity analysis.

In this work the interrelationship between detection and estimation both for scalar and array processing is investigated. Changing environmental conditions reflected in fluctuating noise levels and spatial and temporal uncertainties necessitate the design of flexible space-time processing techniques with good performance characteristics. This work contributes to a basis for adaptive processing, including adaptive array processing.

AD-A030 226/5CP PC **A04**/MF **A01**
Illinois Univ At Urbana-Champaign Dept of Computer Science
A Microprocessor-Controlled Interface for Burst Processing
Master's thesis
Robert Milton Pleva. Jul 76, 69p Rept no. UIUCDCS-R-76-812
Contract N00014-75-C-0982

Descriptors: *Microprocessors, *Burst transmission, *Data transmission systems, Multichannel communications, Interfaces, Coding, Analog signals, Computer programs, Theses.
Identifiers: Computer software, Unary encoding, MICROBURST system.

As part of the research effort investigating the properties and applications of Burst processing, the question of compatibility with the more usual weighted-binary data representations has been considered. The MICROBURST system is a microprocessor-controlled, general-purpose interface system capable of operating in a multichannel Burst environment. System structure, programming details, and support software are discussed. (Author)

AD-A030 363/6CP PC **A03**/MF **A01**
IBM Federal Systems Div Owego N Y
Program Documentation for the Digital Switching Experiment Program
Technical rept.
D. L. Wartluft. Apr 76, 42p AMRL-TR-76-42
Contract F33615-75-C-5152

Descriptors: *Computer program documentation, *Interactive graphics, *Voice communications, Speech recognition, Data processing equipment, Manual operation, Push buttons, Cockpits, Ultrahigh frequency, Real time, Flow charting, Keyboards, Tracking, Pilots.
Identifiers: AN/ARC-34, F-15 aircraft, *Switching theory.

The Digital Switching Experiment Program is an interactive control system used for evaluating three different switching concepts in a simulated aircraft environment. The basic goal of the experiment is to assess pilot switching performance on a simple communications task while engaged in a tracking task that approximates formation flying. The three switching concepts to be evaluated include: (1) a conventional UHF control head (ARC-34) to provide baseline data on present-day manual systems, (2) a pushbutton keyboard (F-15 navigation panel switches) that reflects the proposed DAIS concept for fighter aircraft and, (3) a voice command system that employs an automatic speech recognition system to augment the control of cockpit functions. The program was written for an IBM S/370, Model 155 Computer using the MFT version of the standard Operating System. The simulated cockpit is interfaced through an IBM 1827 Data Control Unit and the graphics displays are presented on two IBM 2250 Display Units. Both assembler language and FORTRAN IV were used in the software development. (Author)

AD-A030 462/6CP PC **A04**/MF **A01**
Defense Communications Engineering Center Reston Va
Avoidance of Collateral Blast Damage to Increase Survivability of Military Telecommunications Networks
Technical note
N. A. Sica. Jul 76, 65p Rept no. TN-22-76

Descriptors: *Communications networks, *Nuclear explosion damage, *Blast, *Telecommunication, Survival(General), Avoidance, Range(Distance), Vulnerability analysis, Nuclear weapons, Nuclear explosions, Computer programs, Algorithms, Damage.
Identifiers: Collateral blast damage.

This report develops a computer program for determining avoidance distance for various probabilities of not being damaged to a specified level. The computer program exploits new algorithms and mathematical approximation methods for blast damage developed by the DIA. The sensitivity of the avoidance distance to changes in various parameters was studied and no unexpected conditions were found. The results of the study are assembled in 11 tables for use in providing guidance in avoiding collateral blast damage. (Author)

AD-A030 508/6CP PC **A05**/MF **A01**
Computer Sciences Corp Falls Church Va
NSW GCOS Connection
Interim rept. 22 Mar-12 Jun 76
Robert J. Grimes. Jul 76, 94p RADC-TR-76-228
Contract F30602-76-C-0199

Descriptors: *Computer communications, *Communications networks, Computer program documentation, Computer files, Cost benefits, Computer programs, Interfaces, Savings, Access, Digital computers, User needs.
Identifiers: *Computer networks, *Honeywell-6180 computers, ARPA computer network.

This report provides a detailed examination of four specific alternatives providing an interface between the Honeywell H6180 (GCOS) and the ARPANET. The ultimate goal is to allow the H6180 to participate in the National Software Works (NSW) as a Tool Bearing Host (TBH). A configuration consisting of the H6180, Asynchronous Bit Serial Interface (ABSI), a PDP-11 operating as a network front-end (NFE) and the network IMP comprised the best alternative. (Author)

AD-A030 551/6CP PC **A02**/MF **A01**
San Jose State Univ Calif Dept of Speech-Communication
Final Report
Rept. for 1 Jul 73-14 Jan 76
Peter R. Monge. Jul 76, 7p Rept no. TR-8
Contract N00014-75-C-0445
Continuation of Contract N00014-73-A-0476-0001.

Descriptors: *Communications networks, *Computer programs, *Job satisfaction, Organizations, Psychology, Social communication, Data acquisition, Models, Structural analysis, Range(Distance), Logic.

The research undertaken pursuant to ONR contract number N00014-73-A-0476-0001 and its continuation contract number N00014-75-C-0445 were designed to develop and test static and dynamic models of the causal antecedents of communication structure in large organizations.

AD-A031 242/1CP PC **A02**/MF **A01**
California Univ Los Angeles Dept of Computer Science
Computer Network Research
Final technical rept. 15 Jun 73-30 Nov 75
Leonard Kleinrock, Gerald Estrin, Michel Melkanoff, Richard R. Muntz, and Gerald Popek..
30 Nov 75, 17p Rept no. UCLA-ENG-7696
Contract DAHC15-73-C-0368, ARPA Order-2496

Descriptors: *Data transmission systems, Communication satellites, Communication and radio systems, Computer programs, Secure communications, Interequipment communication.
Identifiers: *Computer networks, Secure operating systems, PDP-11/45 computers, Secure computer systems, Computer information security, *Communications networks, Computer performance evaluation.

This is the final report for the ARPA Contract number DAHC 15-73-C-0368 at UCLA covering the period from Jun3 15, 1973 to November 30, 1975. During this contract period we have been engaged in the following tasks: providing a sophisticated network measurement facility adequate for a variety of uses such as performance measurement, model validation, and the design of network algorithms; conducting experiments on the network to analyze the effect of transmitting various data sources; defining and extending the tools necessary to analyze and evaluate the performance of computer communication systems; developing models of multiple resource systems and computer networks; studying packet communication systems that incorporate satellite and/or radio communications; and designing and beginning implementation of a verifiably secure operating system for the PDP 11/45. Included is a short statement of accomplishments followed by a complete bibliography of published works which were supported under this research contract. (Author)

AD-A031 391/6CP PC **A02**/MF **A01**
Naval Research Lab Washington D C
Listener Preference and Comprehension Tests of Stress Algorithms for a Text-to-Phonetic Speech Synthesis Program
Interim rept.
Astrid McHugh. 9 Sep 76, 25p Rept no. NRL-8015

Descriptors: *Speech analysis, *Speech transmission, Algorithms, Machine translation, Word recognition, Phonetics, Linguistics, Correlation techniques, Data processing, Computer programs, Test methods.
Identifiers: Speech synthesis, Context sensitive grammars, Reading scale, Text to phonetic programs, Letters to sound rules, Word processing.

Six different stress algorithms were tested to find a relatively simple set of rules that would work well with a text-to-phonetic program of limited size. Algorithms using spelling rules only (no lexical, syntactic, or semantic information) were compared with a monotone and with hand-placed stress (English pronunciation rules). In the preference test, an algorithm that uses statistical regularities in English to assign stress and timing was judged better than a monotone, random stress, and strictly alternating stress. Hand-placed stress was judged better than this algorithm only when combined with timing rules. Comprehension tests revealed differences only with unpracticed subjects, for whom the pattern of results was similar to that of the preference tests. (Author)

AD-A031 509/3CP PC **A08**/MF **A01**
Codex Corp Newton Mass
Codex Speech Digitizer Advanced Development Model
Final rept. Jun 75-Jun 76
G. D. Forney, and S. Qureshi. Jun 76, 171p
Contract DCA100-76-C-0026

Descriptors: *Vocoders, *Digitizers, *Secure communications, *Voice communications, *Speech

transmission, Computer programs, Delta modulation, Coding, Adaptive systems, Algorithms.
Identifiers: Adaptive residual coding, Continuously variable slope delta modulation, Adaptive delta modulation, Adaptive differential pulse code modulations, Digital systems.

This report describes the Codex Speech Digitizer Advanced Development Model. The speech coder operates at rates of 16 and 9.6 kbps using three selectable techniques: Adaptive Residual Coding (ARC), Continuously Variable Slope Delta (CVSD) modulation, and Adaptive Delta Modulation (ADM). (Author)

AD-A031 516/8CP PC **A08**/MF **A01**
Gte Sylvania Inc Needham Heights Mass Electronic Systems Group-Eastern Div
Adaptive Multilevel 16KB/S Speech Coder
Final rept. Nov 75-Jun 76
A. Goldberg. 14 Jun 76, 165p
Contract DCA100-76-C-0002

Descriptors: *Vocoders, *Voice communications, *Speech transmission, *Secure communications, Digital systems, Coding, Computer programs, Synchronization(Electronics), Delta modulation, Signal processing, Algorithms, Interrupters, Channels, Errors, Terminals, Adaptive systems, Predictions.
Identifiers: *Coders, Residual coding, *Adaptive multilevel speech coders, Large scale integrated circuits.

This report describes software designed by GTE Sylvania for a high quality 16,000 bit per sec. speech terminal. This software operates in a full duplex mode on two Sylvania Programmable Signal Processors. (Author)

AD-A031 613/3CP PC **A08**/MF **A01**
Evaluation Technologies Inc Arlington Va
COMMEL II User's Manual. Volume I. Model Overview
Final rept. Oct 75-Feb 76
John K. Waite. Oct 76, 162p CAA-D-76-6-Vol-1
Contract DAAG39-76-C-0014
See also Volume 2, AD-A031 614.

Descriptors: *Tactical communications, *Computerized simulation, Electronics, War games, Programming manuals, User needs, Data bases, Models, Systems analysis.
Identifiers: COMMEL computer code, COMMEL(Communications-electronics), Communications-Electronics, Users manuals, Overviews.

This document is a manual to assist military and operations research analysts in the use of the COMMEL (communications-electronics) 2 Model and in the preparation of the input data base for the model. This manual was prepared by Evaluation Technologies, Incorporated (ETI) under contract to the US Army Concepts Analysis Agency (CAA) to document the COMMEL 2 Model, as improved by ETI; a CAA updating of the manual, where required, based on experience gained while using the model in early 1976 has been included in this edition of the document. The COMMEL 2 Model was an element of the CAA study Communications Operational Effectiveness Methodology. This study was an element of the Operational Effectiveness of Communications methodology development program sponsored by the Deputy Chief of Staff for Operations and Plans (DCSOPS). The COMMEL Model is a fully computerized combat simulation which includes dynamic interface between tactical operations and communications systems. The model output provides statistics on both communications system performance and combat outcome. The COMMEL Model simulates division-level combat with resolution to company level. Tactical and communications activities are represented by four interrelated submodels which periodically transmit event statistics to output files. The model is basically deterministic although message routing factors may be varied through use of random number generator. (Author)

AD-A031 614/1CP PC **A15**/MF **A01**
Evaluation Technologies Inc Arlington Va
COMMEL II User's Manual. Volume II. Input Data Preparation
Final rept. Oct 75-Feb 76
John K. Waite. Oct 76, 338p CAA-D-76-6-Vol-2
Contract DAAG39-76-C-0014
See also Volume 3, AD-A031 615.

Descriptors: *Tactical communications, *Computerized simulation, *Input output processing, Electronics, War games, Military organizations, Data bases, Formats, Systems analysis, Weapons, Communication equipment.
Identifiers: COMMEL computer code, COMMEL(Communications-electronics), Communications-electronics, Users manuals.

Contents: Input Data Blocks and Entry Forms; and Computer Input Card Forms.

AD-A031 615/8CP PC **A06**/MF **A01**
Evaluation Technologies Inc Arlington Va
COMMEL II User's Manual. Volume III. Appendixes
Final rept. Oct 75-Feb 76
John K. Waite. Oct 76, 109p CAA-D-76-6-Vol-3
Contract DAAG39-76-C-0014
See also Volume 1, AD-A031 613.

Descriptors: *Tactical communications, *Computerized simulation, *Preprocessing, *Input output processing, Electronics, War games, Programming manuals, User needs, Simulators, Errors, Message processing, Subroutines.
Identifiers: COMMEL computer code, COMMEL(Communications-electronics), Communications-electronics, Users manuals.

Contents: Error Messages; Preprocessor; and Simulator.

AD-A031 617/4CP PC **A11**/MF **A01**
Bolt Beranek and Newman Inc Cambridge Mass
The Terminal Interface Message Processor Program
Aug 76, 228p Rept no. Technical information-91
Contract DAHC15-69-C-0179, F08606-75-C-0032
Updates report dated May 76, AD-A025 888.

Descriptors: *Data processing terminals, *Digital computers, *Message processing, Modems, Memory devices, Computer programs, Data storage systems, High rate, Formats, Interfaces, Computer programming, Data links.
Identifiers: Terminal interface processors, *Computer networks.

A summary of the Terminal IMP hardware follows. Up to 63 terminals, either remote or local, of widely diverse characteristics may be connected to a given TIP and thereby talk into the network. It is also possible to connect a Host to a TIP in the usual way a Host is connected to an IMP. The TIP is built around a Honeywell H-316 computer with 28K of core. It embodies a standard 16-port multiplexed memory channel with priority interrupts and includes a Teletype for debugging and program reloading. Other features of the standard IMP also present are a real-time clock, power-fail and auto-restart mechanisms, and a program-generated interrupt feature. As in the standard IMP, interfaces are provided for connecting to high-speed (50-kilobit, 230.4-kilobit, etc.) modems as well as to Hosts.

AD-A031 725/5CP PC **A04**/MF **A01**
Texas Univ At Austin Defense Research Lab
Generation of a Stationary Gaussian Random Process with a Specified Power Spectral Density Function
Acoustical rept.
W. A. Matuska, Jr, and G. S. Innis. 27 Oct 66, 72p Rept no. DRL-A-258
Contract NObsr-93175

Descriptors: *Signal processing, *Power spectra, *Time series analysis, Computer programs, Probability density functions, Digital computers, Digital systems, Computer programming, Gaussian quadrature, Random variables, White noise.
Identifiers: Random processes.

This paper gives a method for generating digitally a time series with a given power spectral density function. A computer program to carry out this method was written for the Control Data Corporation 3200 computer, and the program was tried on some specific example problems. Then for each of these examples, the power spectral density function of the generated time series was compared with the specified, theoretical power spectral density function.

AD-A031 909/5CP PC **A07**/MF **A01**
Honeywell Information Systems Inc Mclean Va Federal Systems Operations
Minimizing the Naming Facilities Requiring Protection in a Computing Utility
Technical rept.
Richard Glenn Bratt. Sep 75, 132p ESD-TR-76-161
Contract F19628-74-C-0193, ARPA Order-2641
Prepared in cooperation with Massachusetts Inst. of Tech., Cambridge. Div. of Computer Systems Research.

Descriptors: *Data processing security, *Information processing, Computer programs, Networks, Data processing, Protection, User needs, Interfaces, Computer files, Global, Theses.
Identifiers: *Computer networks, *Security kernel, Multics system, Computer facilities.

This thesis examines the various mechanisms for naming the information objects stored in a general-purpose computing utility, and isolates a basic set of naming facilities that must be protected to assure complete control over user interaction and that allow desired interactions among users to occur in a natural way. Minimizing the protected naming facilities consistent with the functional objective of controlled, but natural, user interaction contributes to defining a security kernal for a general-purpose computing utility. The security kernel is that complex of programs that must be correct if control on user interaction is to be assured. The Multics system is used as a test case, and its segment naming mechanisms are redesigned to reduce the part that must be protected as part of the supervisor. To show that this smaller protected naming facility can still support the complete functionality of Multics, a test implementation of the design is performed. The new design is shown to have a significant impact on the size and complexity of the Multics supervisor. (Author)

AD-A033 092/8CP PC **A04**/MF **A01**
Mitre Corp Bedford Mass
WWMCCS System 700 Remote Terminal, Test and Diagnostic Software Utilization
Final rept.
Kenneth W. Wadman. Oct 76, 62p MTR-3313, ESD-TR-76-285
Contract F19628-77-C-0001

Descriptors: *Command and control systems, *Data processing terminals, *Communication terminals, *Computer programs, *Global communication systems, *Communications networks, Information systems, Faults, Diagnosis(General), Test methods, Off line systems, Data processing.
Identifiers: *Computer software.

Test and Diagnostic software is supplied under the WWMCCS ADP contract to all System 700 remote terminal installations. This paper describes the content of the off-line programs and provides detailed step-by-step procedures for their utilization in a typical Government/contractor maintenance relationship. This effort was accomplished as part of the WWMCCS Communications Fault Isolation task sponsored by the Air Force WWMCCS Program Office. (Author)

AD-A033 351/8CP PC **A05**/MF **A01**
Bolt Beranek and Newman Inc Cambridge Mass
The ARPANET Network Control Center Program
Nov 76, 87 Rept no. Technical Information-90
Contract DAHC15-69-C-0179, F08606-73-C-0027

Descriptors: *Computer communications, Message processing, Computer programs, Interfaces, Data processing terminals, Subroutines, Debugging(Computers), Memory devices.

Identifiers: *ARPA computer network, Host computers, *Computer networks, *Communications networks.

This report describes the NETWORK CONTROL CENTER (NCC) program used in the ARPA Network. The information in the report will explain the functions, structure, and major routines of the NCC program in detail, with diagrams included where helpful. The ARPA Network provides a capability for geographically separated computers, called Hosts, to communicate with each other via common-carrier circuits. Each Host is connected to a small local computer called an Interface Message Processor (IMP); each IMP is connected to several other IMPs via wideband communications lines. The IMPs, most of which are virtually identical, are programmed to store and forward messages to their neighbor IMPs based on address information contained in each message.

AD-A033 559/6CP PC **A05**/MF **A01**
Pattern Analysis and Recognition Corp Rome N Y
WCCM Automated Command and Control Support
Final technical rept. Jul 75-Jul 76
Paul J. Caruso, Larry L. Gadeken, and Richard A. Jayne. Sep 76, 87p PAR-76-18, RADC-TR-76-300
Contract F30602-76-C-0101

Descriptors: *Computer programs, *Command and control systems, *Interactive graphics, Display systems, Position location reporting system, Real time, Computer programming, Position(Location), Broadband, Modems, Remotely piloted vehicles, Automation.

This report describes the software programs developed by Pattern Analysis and Recognition Corporation for the control and monitoring of the Wideband Command and Control Modem Automated Test System at Rome Air Development Center. The first section describes the Test System and the objectives of the project. A functional description of the software is given in the second section. The User's Manual for the system is contained in the third section which gives the operating instructions and depicts the organization of the programs. The Appendix presents the derivations of the mathematical formulas which are used to locate the RPV. (Author)

AD-A033 716/2CP PC **A06**/MF **A01**
Honeywell Inc St Petersburg Fla Aerospace Div
ATEC Digital Adaptation Study. Volume III. Summary and Recommendations
Final technical rept. 27 Jun 75-29 Feb 76
T. R. Armstrong, A. K. Blough Jr., T. J. Campbell, D. T. Doyle, and E. N. Dulaney. Oct 76, 109p 476-13656-Vol-3, RADC-TR-76-302-Vol-3
Contract F30602-75-C-0282
See also Volume 1, AD-A033 538.

Descriptors: *Data transmission systems, *Digital systems, *Communications networks, *Monitors, West Germany, Faults, Automation, Measurement, Computer programs.
Identifiers: Fault isolation, AN/FRC-162.

The automated technical control (ATEC) Digital Adaptation Study sought to answer the questions: (1) What should be monitored for PA/FI/TA of the FKV system; (2) What measurements, data collection, and analysis should a monitor system perform, (3) Is the ATEC system and equipments applicable in satisfying the measurement and analysis requirements, either unmodified or with minor adaptations, and (4) Can an ATEC/FKV demonstration be performed: The study addressed each of these questions in turn, and the answer is that the ATEC system and equipments, augmented by minor hardware and software adaptations, can satisfy all the PA/FI/TA monitoring system requirements for the FKV digital transmission system. An ATEC monitoring system for the entire FKV system is presented and operational characteristics dealing with all aspects of the monitoring system are presented. In addition, an ATEC/FKV demonstration configuration is presented which would enable the validation of the ATEC digital transmission system monitoring capability through field testing and data collection on a link within the FKV system. (Author)

AD-A034 132/1CP PC **A10**/MF **A01**
Gte Sylvania Inc Needham Heights Mass Electronic Systems Group-Eastern Div
Supplemental Conceptual Design Study of an Integrated Voice/Data Switching and Multiplexing Technique for an Access Area Exchange
Final rept. Aug-Oct 76.
11 Nov 76, 207p
Contract DCA100-75-C-0071

Descriptors: *Voice communications, *Data transmission systems, *Time division multiplexing, *Integrated systems, Digital systems, Switching, Computer architecture, Computer programs.

The overall Phase I SENET-DAX study was directed towards investigating the concept of an integrated voice/data switching system based on dynamic allocation of variable-sized increments of a flexible time division multiplexing transmission system. This permits a unified transmission and multiplexing structure that exhibits a high level of transmission efficiency not obtainable by separate voice and data systems, while supporting widely disparate types of communications. The purpose of this supplemental report is to analyze further the integrated voice/packet/data transmission concept established in the Phase I effort, and to determine how it may be realized from generally available hardware, software, and firmware processing modules. Alternate conceptual system designs for an access area exchange model were investigated and an experimental approach to examine the integrated voice/data switching and multiplexing technique for access area application was formulated. In contrast to Phase I, the conceptual designs developed in this report emphasize processor architecture and software structure for an experimental model whose primary purpose is to demonstrate the workability of the basic SENET-DAX transmission concept in a realistic environment. (Author)

AD-A034 274/1CP PC **A07**/MF **A01**
Air Force Inst of Tech Wright-Patterson AFB Ohio School of Engineering
Computer Identification of Phonemes in Continuous Speech
Master's thesis
William R. Hensley. Dec 76, 139p Rept no. GE/EE/76-24

Descriptors: *Speech recognition, *Phonemes, *Computer applications, Identification, Speech analysis, Analog signals, Cross correlation, Prototypes, Fast Fourier transforms, Theses, Spatial filtering, Computer programs.

The purpose of this investigation was to identify phoneme segments as they appeared in continuous speech. The input device was an audio tape recorder from which the analog speech signal was digitized and fast Fourier transformed. The amplitudes of this transformed signal were combined in a logarithmic manner and printed out in a 16 channel digitized spectrogram. Sixty-one prototypes were selected to represent the phonemes of the English language. These prototypes were stored and used in a running crosscorrelation with the unknown speech signal. The amplitude values resulting from the correlation process were used to predict phoneme locations and the values were compared in order to identify the correct phoneme. The phonemes were selected from Speaker A's speech signal and tests were conducted to analyze utterances from Speaker A and Speaker B. For Speaker A, location was rated at 81 percent while identification was rated at 45 percent. For Speaker B, location was found to be 70 percent with identification at 40 percent. Spatial filtering techniques, uniform length prototypes, and various normalization procedures were investigated next with the result of improving location for Speaker B. (Author)

AD-A034 509/0CP PC **A07**/MF **A01**
Stanford Telecommunications Inc Mountain View Calif
Definition of Real-Time Adaptive Control (RTAC) of the Defense Satellite Communications System (DSCS). Volume V. Computer Program Description and Development for a Real-Time Adaptive Control Study
Final rept. Jul 75-Aug 76
G. D. Heinz, and G. O. Trebaol. 30 Aug 76, 128p
Rept no. STI-TR-6001-Vol-5
Contract DCA100-75-C-0062
Prepared in cooperation with ESL, Inc., Sunnyvale, Calif. Electromagnetic Systems Labs. See also Volume 1, AD-A034 506.

Descriptors: *Satellite communications, *Adaptive control systems, *Communications networks, Telemeter systems, Real time, Monitors, Communications traffic, Configurations, Communication satellites.
Identifiers: RTAC(Real Time Adaptive Control), Real time adaptive control, Fault detectors, Jamming detectors, Report generators.

This report presents the results of a concept definition study for a real-time adaptive control (RTAC) system which is being planned for the Defense Satellite Communications System (DSCS) for the Post 1980 era. In particular, this volume describes a computer-based system performance model used to analyze the effective performance improvements to be expected from RTACS. (Author)

AD-A035 165/0CP PC **A05**/MF **A01**
Bolt Beranek and Newman Inc Cambridge Mass
Speech Understanding Systems. Volume I. Introduction and Overview
Final rept. 30 Oct 74-29 Oct 76
William A. Woods, Madeleine Bates, Geoffrey Brown, Bertram C. Bruce, and Craig C. Cook.
Dec 76, 90p Rept no. BBN-3438-Vol-1
Contract N00014-75-C-0533
See also Volume 2, AD-A035 166.

Descriptors: *Speech recognition, *Signal processing, Speech analysis, Voice communications, Man machine systems, Phonetics, Context sensitive grammars, Computational linguistics, Information processing, Computer programs, Performance tests, Syntax, Semantics, Algorithms, Natural language, Man computer interface, Voice communications.
Identifiers: *Speech processing, HWIM computer programs.

This five-volume report reviews the BBN speech understanding system. The speech understanding project attempts to develop a continuous speech understanding system which uses syntactic, semantic, and pragmatic support from higher level linguistic knowledge sources to compensate for the inherent acoustic indeterminacies in continuous spoken utterances. These knowledge sources are integrated with sophisticated signal processing and acoustic-phonetic analysis of the input signal, to produce a total system for understanding continuous speech. The system contains components for signal analysis, acoustic parameter extraction, acoustic-phonetic analysis of the signal, phonological expansion of the lexicon, lexical matching and retrieval, syntactic analysis and prediction, semantic analysis and prediction, pragmatic evaluation and prediction, and inferential fact retrieval and question answering, as well as synthesized text or spoken output.

AD-A035 166/8CP PC **A05**/MF **A01**
Bolt Beranek and Newman Inc Cambridge Mass
Speech Understanding Systems. Volume II. Acoustic Front End
Final rept. 30 Oct 74-29 Oct 76
William A. Woods, Madeleine Bates, Geoffrey Brown, Bertram C. Bruce, and Craig C. Cook.
Dec 76, 92p Rept no. BBN-3438-Vol-2
Contract N00014-75-C-0533
See also Volume 1, AD-A035 165.

Descriptors: *Speech recognition, *Signal processing, *Acoustic equipment, Speech analysis, Voice communications, Phonetics, Context sensitive grammars, Speech representation, Computer programs, Phonemes, Natural language, Pattern recognition, Phonetics, Algorithms, Man computer interface, Performance tests, Man machine sys-

tems, Computational linguistics, Information processing, Computer program verification.
Identifiers: *Speech processing, HWIM computer programs.

Contents: Acoustic Front End; Acoustic-Phonetic Recognition; A Speech Synthesis-by-Rule Program; and Verification.

AD-A035 167/6CP PC **A06**/MF **A01**
Bolt Beranek and Newman Inc Cambridge Mass
Speech Understanding Systems. Volume III. Lexicon, Lexical Retrieval and Control
Final technical progress rept. 30 Oct 74-29 Oct 76
William Woods, Madeleine Bates, Geoffrey Brown, Bertram C. Bruce, and Craig C. Cook. Dec 76, 119p Rept no. BBN-3438-Vol-3
Contract ARPA Order-2904, Grant N00014-75-C-0533
See also Volume 1, AD-A035 165.

Descriptors: *Speech recognition, *Signal processing, *Dictionaries, Speech analysis, Phonetics, Context sensitive grammars, Vocabulary, Information processing, Natural language, Computer programs, Speech representation, Voice communications, Pattern recognition, Algorithms, Budgets, Man computer interface, Performance tests, Man machine systems, Computational linguistics, Computer program verification, Information retrieval, Lexicography.
Identifiers: *Speech processing, HWIM Computer programs.

Contents: Dictionary; Phonological rules; Dictionary Expansions; Lexical Retrieval; Control Strategy; and System Performance.

AD-A035 277/3CP PC **A07**/MF **A01**
Bolt Beranek and Newman Inc Cambridge Mass
Speech Understanding Systems. Volume IV. Syntax and Semantics
Final technical progress rept. 30 Oct 74-29 Oct 76
William A. Woods, M. Bates, G. Brown, B. Bruce, and C. Cook. Dec 76, 139p Rept no. BBN-3438-Vol-4
Contract N00014-75-C-0533, ARPA Order-2904
See also Volume 5, AD-A035 278.

Descriptors: *Speech recognition, *Signal processing, *Syntax, *Semantics, Speech analysis, Phonetics, Context sensitive grammars, Information processing, Natural language, Computer programs, Speech representation, Voice communications, Pattern recognition, Algorithms, Man computer interface, Man machine systems, Computational linguistics, Information retrieval, Parsers, Budgets.
Identifiers: *Speech processing, HWIM computer programs.

Contents: Parsers; Grammars; and Prosodics.

AD-A035 278/1CP PC **A06**/MF **A01**
Bolt Beranek and Newman Inc Cambridge Mass
Speech Understanding Systems. Volume V. Trip
Final technical progress rept. 30 Oct 74-29 Oct 76
William A. Woods, M. Bates, G. Brown, B. Bruce, and C. Cook. Dec 76, 123p Rept no. BBN-3438-Vol-5
Contract N00014-75-C-0533, ARPA Order-2904
See also Volume 1, AD-A035 165.

Descriptors: *Speech recognition, *Signal processing, Speech analysis, Phonetics, Context sensitive grammars, Information processing, Natural language, Computer programs, Speech representation, Voice communications, Pattern recognition, Algorithms, Man computer interface, Man machine systems, Computational linguistics, Information retrieval, Parsers, Intelligibility, Comprehension, Budgets, Travel.
Identifiers: *Speech processing, HWIM computer programs.

Contents: Natural Communication with a Computer; Types of Knowledge Needed; Representations and Processing; Travel Budget Management; Flow of Control; Parsing; Semantic Interpretation; SEMNET - The Network Utility Package; Command Language; Data Base Structure; Discourse Model; Text Response Generation; and Speech Synthesis.

AD-A035 564/4CP PC **A08**/MF **A01**
Carnegie-Mellon Univ Pittsburgh Pa Dept of Computer Science
Analysis of Languages for Man-Machine Voice Communication
Interim rept.
Robert Gary Goodman. Sep 76, 171p AFOSR-TR-77-0055
Contract F44620-73-C-0074, ARPA-Order-2446
Prepared in cooperation with Stanford Univ., Calif. Doctoral thesis.

Descriptors: *Speech analysis, *Speech recognition, *Computer programs, Phonetics, Lexicography, Syntax, Speech, Words(Language), Ambiguity, Vocabulary, Difficulty, Context free grammars, Man machine systems, Voice communications, Theses.
Identifiers: Complexity.

This dissertation describes a general model for the analysis of languages for man-machine communication. It is the first known study of ambiguity at all levels of recognition and represents the best analytical tool, to date, for the design of languages. The model unifies the concepts of ambiguity and restriction done by expressing each as a branching factor--a notion which is easily understood and visualized. Ambiguity increases the branching factor while restriction reduces it. Using branching factor has the advantage that an effective search space size may be computed for any language. Further, since ambiguity and syntactic restriction are expressed in a uniform way, the effect of one with respect to the other may be evaluated by considering search space reduction ratios. The model is useful for comparing the relative complexities faced by speech understanding systems. Effective vocabulary size provides a way of measuring the complexity in isolated word recognition while effective search space size measures language complexity. Thus, the performance of 2 systems may be contrasted by using these measures; previously, this could be done only if the 2 systems had been tested using the same data; a situation which occured rarely.

AD-A035 886/1CP PC **A04**/MF **A01**
Naval Postgraduate School Monterey Calif
Redundant Ring Structures for Shipboard Distributed Computer Systems
Master's thesis
Peter Burgess Snyder. Dec 76, 73p

Descriptors: *Communications networks, *Computer communications, *Data transmission systems, *Redundant components, *Data processing, Shipboard, Theses, Digital computers, Computer programs, Failure, Damage, Multiplexing, Procurement.
Identifiers: Redundant ring structures, Shipboard data communication, Ring structures, Distributed ring computing systems, Computer science, Redundant networks, TRMP(Triply Redundant Multiple Path) system, Triply redundant multiple path system, Availability, Systems design, Modular structures, *Distributed computer systems.

The potential constraints on a ring structured distributed computing system imposed by the shipboard environment were discussed. The feasibility of increasing distributed ring system availability to meet the requirements were investigated. It was shown that with a multiply linked ring structure, shipboard environmental effects would not severely degrade successful operation of a distributed system. This finding could result in the utilization of distributed ring computing systems with suitably redundant data path schemes as a highly reliable general purpose data processing system on shipboard platforms. (Author)

AD-A036 437/2CP PC **A05**/MF **A01**
Office of Telecommunications Boulder Colo Inst for Telecommunication Sciences
A Simulation Model for Analyzing Performance of Some Simple Communication Systems on a Digital Computer
Hiroshi Akima, and Arthur D. Spaulding. Nov 76, 85p FAA/RD-76/181
Contract DOT-FA74WAI-431

Descriptors: *Communication and radio systems, *Computerized simulation, Digital computers, Radiofrequency interference, Distortion, Noise(Radio), Computer programs, FORTRAN.

A digital-computer simulation model for analyzing performances of some simple communication systems is being developed for the purpose of studying the effects of interfering signals, noise, and/or distortions on various communication systems. Development of the model is largely based on the analogy with the laboratory tests of communication system performances. The model consists of computer subprograms, each of which either simulates a basic component of communication systems or calculates characteristics of a component. An introductory explanation of computer simulation, guidelines for developing a simulation model, an outline of the model, and some example programs are presented. Complete Fortran listings and a user manual are also presented.

AD-A037 086/6CP PC **A03**/MF **A01**
Electronics Engineering Group (1842nd) Richards-Gebaur AFB Mo
Evaluation of the Burroughs 3500 CRT Enhancement Program Communications System
Technical rept.
Daniel S. Willett, and Jerry R. Barton. 31 Jan 77, 43p Rept no. 1842 EEG/EETDD-TR-77-12

Descriptors: *Communication terminals, *Cathode ray tubes, *Digital computers, Computer programs, Modems, Electric bridges, Communications networks, Systems engineering, Frequency modulation, Data transmission systems, Attenuators, Amplifiers, Noise generators.
Identifiers: Burroughs 3500 computers.

This report describes the evaluation of the Burroughs 3500 CRT Enhancement Program communications system, performed at Barksdale AFB, La. Included in the report are the results of the evaluation and recommendations to improve the performance of the system. (Author)

AD-A037 118/7CP PC **A07**/MF **A01**
Mitre Corp Bedford Mass
High Altitude Satellite Communications, with Crosslinks
Technical rept.
P. F. Christopher, E. R. Edelman, and S. M. Maciorowski. Jan 77, 130p MTR-3161, ESD-TR-76-363
Contract F19628-76-C-0001

Descriptors: *Communication satellites, *Communication satellite terminals, *Computer programs, Central processing units, High altitude, Moon, Fortran, Downlink, Angles, Orbits, Perturbations, Ground stations.
Identifiers: *Crosslinks, *Satellite communications, Uplink.

Analysis and FORTRAN programs that quantitatively describe the uplink, crosslinks, and downlinks for a 10 satellite, two ground-station satellite communications system are described. The existence of each link (accounting for earth obstruction for crosslinks and coverage for up/downlinks), angles, ranges, and Dopplers are given as outputs of the programs listed in less than one minute central processing unit (CPU) time on a 370/158 computer. General Keplerian orbits are allowed (0< or = eccentricity < or = 0.99). A new analysis is presented, which results in simple estimates of orbital stability as a function of lunar perturbations. Thus, very general satellite communication orbits (altitude range 3000 to 250,000 nautical miles) can be analyzed with little additional CPU time. (Author)

AD-A037 214/4CP PC **A02**/MF **A01**
Stanford Univ Calif Digital Systems Lab
SCCU/MCCU Characteristics for Autodin II
Technical note

Vinton G. Cerf. Jul 76, 25p Rept no. DSL-TN-92
Contract MDA903-76-C-0093, ARPA Order-2494

Descriptors: *Communications networks, *Multichannel communications, *Communication switching centers, High level languages, Computer programs, Packets, Channels, Interfaces, Cost estimates, Automatic, Digital systems.
Identifiers: *Autodin, Computer networks, Host computers, Computer software, Internetting, ARPA computer network.

This note considers the cost and performance of the Single-Channel and Multi-Channel Control Units (SCCU, MCCU) which could be used to connect host computers to the AUTODIN 2 network with little or no software modification to the attaching host. The SCCU provides a single switchable logical connection (possibly spanning more than the AUTODIN 2 network) to another host. The MCCU provides multiple, switchable connections. Results from the ARPANET internetting research project are used as a basis for this note. (Author)

AD-A037 226/8CP PC **A09**/MF **A01**
Harris Corp Melbourne Fla Electronic Systems Div
Multiplex Simulator Design Study
Final technical rept. Apr 73-Jun 76
Jaime A. Gracia, and P. J. Knoke. Jan 77, 189p
AFAL-TR-76-201
Contract F33615-73-C-1172

Descriptors: *Multiplexing, *Computer aided design, Simulators, Computerized simulation, FORTRAN, Information transfer, Data transmission systems.
Identifiers: GASP computer program, MUXSIM computer program.

This report covers the definition, design, and development of MUXSIM (Multiplex Systems Simulator), a software package which performs computer-aided design and design verification of digital information transfer/multiplex systems. MUXSIM is primarily an aid for an organized approach at specifying and designing multiplex systems for diverse applications. It is a tool for obtaining answers to some complex digital multiplex system implementation problems, such as command and control techniques for data transfer, data bus requirements, system interface hardware requirements, and data processing and manipulation requirements. The simulator is capable of adapting to new workload requirements and system configurations, as well as handling unknowns through employment of FORTRAN, GASP, and a simulator utility package. (Author)

AD-A037 833/1CP PC **A14**/MF **A01**
Georgia Inst of Tech Atlanta Electronics Technology Lab
Interactive Communication Systems Modeling Study
Final technical rept. Jun 75-Aug 76
Richard W. Moss, Robert W. Rice, and Donald R. Sentz. Feb 77, 311p RADC-TR-77-42
Contract F30602-75-C-0247

Descriptors: *Digital systems, *Communication terminals, Display systems, Computerized simulation, Monte Carlo method, Information retrieval, Digital computers, Frequency shift keyers, Phase shift keyers, Signal to noise ratio, Bandwidth, Tropospheric scatter communications, Computer programs, Systems engineering.
Identifiers: Interactive systems, C-8500 computers.

This report deals with an effort to develop an interactive computer model for analysis and design of digital communications systems. In this report concepts are formulated and described for a Model for Interactive design and Analysis of Communication Systems (MIDACS). Methods of approach for concept formulation are described, examples of previous modeling approaches are presented, characteristics of the MIDACS concept are documented, and a representative computer model is described. Various interactive approaches are shown along with general hardware and software requirements. The formulated interactive concept includes the computer, display devices, and other input/output devices. Mathematical modeling approaches are described including standard Monte Carlo techniques, deterministic methods, and analytical models. The recommended modeling structure includes a modified Monte Carlo technique to minimize computer time for certain communication system performance measures. A multi-level analysis structure is recommended which includes a hierarchy for the physical model combined with a hierarchy of analysis levels which permits greatest computer use flexibility. The recommended programming structure is described including the development chain, software composition, and approach to software development. Function and system library elements are identified and MIDACS hardware requirements are stated. (Author)

AD-A037 903/2CP PC **A04**/MF **A01**
Naval Electronics Lab Center San Diego Calif
Electromagnetic System Interaction Algorithms (SEMCA, IPM, TRED, and COSAM are Compared with Respect to Modeling Philosophy, Flexibility, Data Base, Noises and Interferences, Interference Threshold Criteria, Attenuation Modeling and Antenna Coupling, and Printouts)
Technical document
St Li. 3 Jan 77, 60p Rept no. NELC-TD-506

Descriptors: *Electromagnetic environments, *Electromagnetic compatibility, *Electromagnetic interference, Algorithms, Coupling(Interaction), Computer programs, Shipboard, Models, Antennas, Radiofrequency, Data bases, Threshold effects, Attenuation, Errors, Transmitters, Receivers.
Identifiers: TRED(Transmitter and receiver equipment development).

TRED is a system design tool while SEMCA, IPM, and COSAM are mainly used as interference prediction tools. A user-computer interactive program is recommended. It would be based on the TRED design philosophy and would be used during the design stage of shipboard RF communication systems. In addition, a performance evaluation program for shipboard RF communication systems is recommended. The purpose of the evaluation is to predict final system performance in terms of articulation index and bit error rate. (Author)

AD-A038 132/7CP PC **A04**/MF **A01**
Stanford Research Inst Menlo Park Calif
Modeling of Transionospheric Radio Propagation
Final quarterly technical rept. 16 Feb-14 May 75
E. J. Fremouw, and C. L. Rino. Aug 75, 54p
Contract F30602-74-C-0279, ARPA Order-2777

Descriptors: *Ionospheric scintillations, Ionospheric models, Radio waves, Geomagnetism, Scattering, Computer programs, Gaussian noise, Statistical processes, Global.
Identifiers: *Radio transmission.

This is the final quarterly technical report on a one-year contract to extend and improve an existing empirical model for worldwide behavior of ionospherically imposed radio-wave scintillation. The objectives of the project were (1) to improve the accuracy of model-based calculations of the intensity-scintillation index and (2) to develop a capability for full description (from the point of view of engineering applications) of the first-order, complex-signal statistics that characterize the trans-ionospheric radio communication channel. A follow-on project has been initiated to extend the channel model to include second-order signal statistics in the temporal, spatial, and spectral domains. The first priority in the follow-on work will be to calculate the fluctuation spectra of relevant signal parameters. In addition, it is intended to extend validity of the model into the multiple-scatter regime.

AD-A038 142/6CP PC **A04**/MF **A01**
Syracuse Univ N Y Dept of Electrical and Computer Engineering
Antenna Pattern Distortion Computer Program
Jose Perini, and Kazuhiro Hirasawa. Jan 77, 68p
RADC-TR-77-35
Contract F30602-75-C-0121

Descriptors: *Antenna radiation patterns, *Computer programs, *Electromagnetic compatibility, *Antennas, Electromagnetic fields, Distortion, Coupling(Interaction), Communication equipment, Geometry, Parameters.
Identifiers: Mutual coupling.

The Antenna Pattern Distortion Computer Program is a user oriented code that allows the engineer designing a communication antenna farm to easily enter the antennas involved by simply calling their AF number (AT1181, AT1097, AT197, and a lightning rod LR1000) and specifying their location on an arbitrary reference plane. This reformer plane may be specified as a perfectly conducting infinite ground plane if desired. The program output may be any specified horizontal or vertical pattern. It can also calculate the mutual coupling between any two antennas. If the information provided by the AFCS SCREEN is available, the program can provide plots of the communication range of station when the antenna pattern, antenna power, terrain topography, and receiver sensitivity are specified for any specified aircraft altitude. (Author)

AD-A038 261/4CP PC **A04**/MF **A01**
Honeywell Information Systems Inc Mclean Va Federal Systems Operations
Security Kernel Evaluation for Multics and Secure Multics Design, Development and Certification
Semi-annual progress rept. 1 Jan-30 Jun 76
N. Adleman, J. R. Gilson, R. J. Sestak, and R. J. Ziller. 6 Aug 76, 67p ESD-TR-76-298
Contract F19628-74-C-0193

Descriptors: *Data processing security, *Computer communications, *Secure communications, Data processing, Input output processing, Access, Computer program documentation, Minicomputers, Central processing units, Programming languages, Computer programs.
Identifiers: Guardian project, Computer software, *Multics system.

The goal of Project Guardian is to design, develop, and certify a secure Multics to provide a certified secure multilevel computer utility. The report covers activities from January to June 1976 with an introductory summary of prior work. Activities reported include simplification of the Multics operating system, development of the Multics security kernel, design of the Secure Communications Processor (SCOMP) hardware, development of the SCOMP security kernel, methodology for certifying software, and development of ruggedized SCOMP hardware. A list of all documentation produced under the contract during this period is included. (Author)

AD-A038 344/8CP PC **A11**/MF **A01**
Bolt Beranek and Newman Inc Cambridge Mass
The Terminal Interface Message Processor Program
Feb 77, 228p Rept no. Technical Information-91
Contract DAHC15-69-C-0179, F08606-75-C-0032
Update for TIP Version 410. Supersedes report dated Aug 76, AD-A031 617.

Descriptors: *Data processing terminals, *Digital computers, *Message processing, Modems, Memory devices, Computer programs, Data storage systems, High rate, Computer programs, Formats, Interfaces, Computer programming, Data links.
Identifiers: Terminal interface message processors, *Computer networks.

Understanding the Terminal IMP software depends on an understanding of the hardware environment in which the software resides. A summary of the Terminal IMP hardware follows. Up to 63 terminals, either remote or local, of widely diverse characteristics may be connected to a given TIP and thereby 'talk' into the network. It is also possible to connect a Host to a TIP in the usual way a Host is connected to an IMP. The TIP is built around a Honeywell H-316 computer with 28K of core. It embodies a standard 16-port multiplexed memory channel with priority interrupts and includes a Teletype for debugging and program reloading. Other features of the standard IMP also present are a real-time clock, power-fail and auto-restart mechanisms, and a program-generated interrupt feature. As in the standard IMP, interfaces are provided for connecting to high-speed (50-kilobit, 230.4-kilobit, etc.) modems as well as to Hosts. Aside from the additional 12K of core memory, the primary hardware feature which distinguishes the TIP from a standard IMP is a Multi-Line Controller (MLC) which allows for connection of terminals to the IMP. Any of the MLC lines may go to local terminals or via modems to remote terminals.

AD-A038 356/2CP PC **A08**/MF **A01**
Air Force Weapons Lab Kirtland AFB N Mex
Data Analysis for Stochastic Processes
Final rept.
James E. Negro. Feb 77, 159p Rept no. AFWL-TR-76-193
See also Rept. no. AFWL-TR-75-165 dated Feb 76, AD-B009 867L.

Descriptors: *Stochastic processes, *Data processing, *Signal processing, Spectral energy distribution, Power spectra, Transfer functions, Time domain, Coherence, Probability distribution functions, Probability density functions, Computer programs, Subroutines, Confidence level.

This report is tailored for use as a companion document to SIGANAL: A MODULAR SIGNAL ANALYSIS PROGRAM, which is a comprehensive package of software routines for signal analysis applications. The purpose of this report is to yield understanding and interpretation of practical stochastic signal analysis procedures and results. Basic mathematical foundations for stochastic processes are presented and the extended to the calculations of Power Spectral Densities, cross-spectral densities, coherence functions, and transfer functions. Practical aspects of data processing such as sampling, finite materials, and confidence bounds are explained. A simple numerical example is developed to demonstrate most of the analytical tools developed in the report.

AD-A038 433/9CP PC **A09**/MF **A01**
Computer Sciences Corp Falls Church Va
Design Plan for GCOS/ARPANET Interface
Final technical rept. 12 Mar-12 Dec 76.
Mar 77, 179p RADC-TR-77-87
Contract F30602-76-C-0199

Descriptors: *Data processing terminals, Computer program documentation, Executive control programs, Minicomputers, Digital computers, Computer programs, Computer communications, Computer files, Front end processors, Teletype systems, Real time.
Identifiers: *Computer networks, ARPA computer network, *Computer software, H 6000 computers, PDP 11 computers, Design, Host computers, *Communications networks.

This report contains a specification of the hardware/software interface between the Honeywell H635/6180 GCOS System and a PDP 11/35 ELF System for the purpose of providing ARPANET/NSW access. (Author)

AD-A038 531/0CP PC **A07**/MF **A01**
Air Force Inst of Tech Wright-Patterson AFB Ohio School of Engineering
Analysis of Wideband Scope Creek Report Data Using Computer Techniques
Master's thesis
Earl F. Reynolds. Dec 76, 150p Rept no. AFIT/GE/EE/76D-39

Descriptors: *Information theory, *Tropospheric scatter communications, Computer programs, Line of sight, Broadband, Frequency modulation, Signal to noise ratio, Models, Scattering, Attenuation, Theses, Subroutines.
Identifiers: *Communications theory, Scope Creek project.

A computer program which performs analysis on data measured during Scope Creek evaluations has been developed. The program is capable of analyzing data measured on both line-of-sight and troposcatter communications systems. Both individual equipment and system measured data can be analyzed by the program. The models used by Scope Creek engineers, and in the program, to predict theoretical performance of communications systems are presented. Recommendations are given to improve the accuracy of the theoretical models and usefulness of the Scope Creek data. (Author)

AD-A038 780/3CP PC **A04**/MF **A01**
Naval Postgraduate School Monterey Calif
Extended Kalman Filtering Applied to the Position Locating and Reporting System (PLRS)
Master's thesis
Bernard M. de Mahy, Jr. Dec 76, 58p

Descriptors: *Position location reporting system, *Kalman filtering, Observers, Battlefields, Military tactics, Computer programs, Simulation, Data processing, Display systems, Jet aircraft, Motion, Theses.

The Marine Corps and Army are developing a Position Locating Reporting System to aid the battlefield commander in locating his assets during battle. This study has applied Extended Kalman Filtering techniques to that problem, evolving from a simple Extended Kalman Filter Observer to three moving observers, whose position is uncertain, estimating the position of another unit. (Author)

AD-A039 329/8CP PC **A13**/MF **A01**
New England Council of Optometrists Boston Mass
Integrated DoD Voice and Data Networks and Ground Packet Radio Technology Volume 1. Integrated DoD Voice and Data Networks. Part 1
Semiannual technical rept. no. 8
Howard Frank, and Israel Gitman. Mar 77, 291p
Contract DAHC15-73-C-0135, ARPA Order-2286
See also Volume 1, Part 2, AD-A039 330.

Descriptors: *Communications networks, *Computer programs, *Voice communications, *Communication and radio systems, *Communication switching centers, Packets, Store and forward communication systems, Communications traffic, Costs, Throughput, Department of Defense, Telecommunication, Routing, Integrated systems.
Identifiers: Computer networks, ARPA computer network, Autodin, Autovon, Packet switching, Computerized switching.

New research results on the following major questions are reported: Results on integrated DOD Voice and Data Networks include: analytical models for determining blocking and delay on an integrated link and numerical investigation as a function of traffic and design variables; algorithms for integrated network design were developed and programmed. The program is capable of designing networks for voice traffic, signaling and data traffic. A circuit switch model for determining switch and network transit delays for circuit connection set-up was developed. A methodology for classification of telecommunications routing algorithms was developed. Results on topological gateway placement include an algorithm and program for interconnecting packet switched networks, studies of cost/performance tradeoffs, and an application to interconnect the ARPANET and AUTODIN 2. In the packet radio area models were developed to estimate network initialization as a function of number of repeaters, transmission rates of repeaters and station, and operation disciplines. Finally, cost trends for large volume packet switched data networks are derived which incorporate switching and transmission costs, satellite and terrestrial channels and local distribution. (Author)

AD-A039 330/6CP PC **A12**/MF **A01**
Network Analysis Corp Glen Cove N Y
Integrated DoD Voice and Data Networks and Ground Packet Radio Technology. Volume 1. Integrated DoD Voice and Data Networks. Part 2
Semiannual technical rept. no. 8
Howard Frank, and Israel Gitman. Mar 77, 259p
Contract DAHC15-73-C-0135, ARPA Order-2286
See also Volume 2, AD-A039 331.

Descriptors: *Communications networks, *Computer programs, *Communication switching centers, *Voice communications, Packets, Speech transmission, Communications traffic, Mathematical models, Data links, Models, Data transmission systems.
Identifiers: Packet switching, Computerized switching.

Contents: Network Models for Packetized Speech; and A Circuit Switch Node Model.

AD-A039 331/4CP PC **A05**/MF **A01**
Network Analysis Corp Glen Cove N Y
Integrated DoD Voice and Data Networks and Ground Packet Radio Technology Volume 2. Cost Trends for Large Volume Packet Networks
Semiannual technical rept. no. 8
Howard Frank, and Israel Gitman. Mar 77, 88p
Contract DAHC15-73-C-0135, ARPA Order-2286
See also Volume 3, AD-A039 332.

Descriptors: *Communications networks, *Computer programs, *Voice communications, *Communication switching centers, Packets, Communication satellites, Cost models, Communications traffic, Trade off analyses, Multiplexing.
Identifiers: Design, Packet switching, Computerized switching.

Previous NAC data network studies have revealed the fundamental properties and relative costs of a variety of network architecture alternatives. The cost comparisons were made with a constant backbone subnet average end-to-end delay - a crucial performance parameter. Complex line cost structures were created to accurately model existing and projected tariffs. This study focuses on the packet-switched network approach with all users fully integrated in an overall facility sharing plan. Simplifying assumptions are made throughout so that fundamental design decision tradeoffs can be revealed and so that the sensitivities to cost trends brought about by new technologies can be assessed.

AD-A039 332/2CP PC **A05**/MF **A01**
Network Analysis Corp Glen Cove N Y
Integrated DoD Voice and Data Networks and Ground Packet Radio Technology Volume 3. Topological Gateway Placement Strategies
Semiannual technical rept. no. 8
Howard Frank, and Israel Gitman. Mar 77, 90p
Contract DAHC15-73-C-0135, ARPA Order-2286
See also Volume 4, AD-A039 333.

Descriptors: *Communications networks, *Computer programs, *Voice communications, *Communication switching centers, Packets, Intercommunication systems, Communications traffic, Data bases, Topology, FORTRAN, Routing, Data links.
Identifiers: Autodin, ARPA computer network, Gateways, PDP 10 computers, Packet switching, Computerized switching.

Internetwork communication has become an increasingly active area of research in the last few years. However, up to now, most research efforts have been concentrated on the protocol and gateway design issues. The purpose of this study is to investigate the topological design related issues.

AD-A039 333/0CP PC **A05**/MF **A01**
Network Analysis Corp Glen Cove N Y
Integrated DoD Voice and Data Networks and Ground Packet Radio Technology Volume 4. Ground Packet Radio Technology
Semiannual technical rept. no. 8
Howard Frank, and Israel Gitman. Mar 77, 100p
Contract DAHC15-73-C-0135, ARPA Order-2286
See also Volume 1, Part 1, AD-A039 329.

Descriptors: *Communications networks, *Computer programs, *Voice communications, *Communication switching centers, Packets, Radio repeaters, Markov processes, Buffer storage, Radio interference.
Identifiers: First in first out, Markov chain, Packet switching, Computerized switching.

Repeaters in the radio network need to be initialized by the station; namely, to receive a so-called label which enables addressing specific devices during packet transportation. It is assumed that a priori the station is not informed of the existance and location of specific repeaters. Hence, the initialization process involves sending special control packets, called Repeater On Packets (ROP's) from repeaters to the station to inform existance and location, the transmission of labels by the station to repeaters identified, and the transmission of End-to-End Acknowledgments (ETE Ack's) by repeaters which receive a label. A repeater is considered by the station to be initialized after the station receives an ETE Ack to the label packet.

AD-A039 599/6CP PC **A03**/MF **A01**
Bolt Beranek and Newman Inc Cambridge Mass
TENEX MSG User Manual
Technical rept. 1 Aug 76-30 May 77
Robert H. Thomas, and Paul R. Johnson. Apr 77, 32p Rept no. BBN-3540
Contract N00014-75-C-0773, ARPA Order-2935

Descriptors: *Computer communications, *Programming manuals, Computer programs, Machine coding, User needs, Message processing, Computer files, Interfaces, Error correction codes, Debugging(Computers).
Identifiers: User manuals, *Tenex system, MSG computer program.

This report describes the implmentation of MSG, the interprocess communication facility for the National Software Works (NSW) system, for the (TENEX) system. It is intended as a reference for programmers who use MSG and as a guide for those responsible for the operation of systems, such as NSW, which uses MSG. (Author)

AD-A039 720/8CP MF **A01**
Air Force Inst of Tech Wright-Patterson AFB Ohio School of Engineering
Modification of the AN/TGC-26 Multiple Address Processing Unit to Accept JANAP 128 Format
Master's thesis
Robert G. Shively. Mar 77, 132p Rept no. AFIT/GE/EE/77-3
Availability: Microfiche copies only.

Descriptors: *Communications central, *AN/TGC-26, *Communication switching centers, *Data processing equipment, Teletype systems, Secure communications, Communications traffic, Flow charting, Computer programs, Punched tape, Modification, Timing circuits, Formats, Theses, Logic circuits.

The Multiple Address Processing Unit (MAPU) of the AN/TGC-26 tape relay center was originally designed to process ACP 127 message format. With the advent of JANAP 128 as a standardized message format a pressing need was felt for a MAPU modification to allow processing of this format. Under the sponsorship of AFCS/DOOT, a partial MAPU was assembled at the Air Force Institute of Technology, and the code recognition logic circuitry was redesigned. Software simulations of the proposed redesign were tested using the Digital Logic Simulator program on the CDC CYBER computer system. A final prototype version of the modified MAPU was successfully tested at Wellesley Air National Guard Station, Massachusetts, using the personnel and equipment of the 253rd CMBTCG. A final schematic diagram and production recommendations are presented herein. (Author)

AD-A039 772/9CP PC **A14**/MF **A01**
Air Force Inst of Tech Wright-Patterson AFB Ohio School of Engineering
A General Computer Network Simulation Model
Master's thesis
Hoyt M. Warren, Jr. Mar 77, 325p Rept no. AFIT/GCS/EE/77-3

Descriptors: *Computerized simulation, Computers, Networks, Mathematical models, Simulation languages, Computer architecture, Costs, Data processing terminals, Multiplexing, Computer program documentation, Performance, Theses, Computer communications, Data processing security, Flow charting.
Identifiers: *Computer networks, Computer software, Host computers, Users manuals.

The emphasis of this investigation is on the development of a general computer network simulation model for the evaluation of alternative computer network configurations. The simulation model allows a computer network and its workload to be characterized and then allows selected performance measures to be made. The various phases of the development process are discussed. In the initial phase, symbolic system modeling and simulation techniques are surveyed. This discussion dwells heavily upon discrete-event modeling and simulation techniques. Next, the component architectures and essential performance measures of computer networks are investigated. Then, a computer network model is presented. The features of the network model are discussed and a description of job flow is given. This discussion describes the characterization and interrelationships of the various model variables and the algorithms governing their behavior.

AD-A040 014/3CP PC **A08**/MF **A01**
Naval Postgraduate School Monterey Calif
A Calculator Controlled Microwave Network Analyzer System
Master's thesis
David K. Young. Mar 77, 165p

Descriptors: *Microwave networks, Calculators, Digital to analog converters, Computer programs, Interfaces, Data displays, Data storage systems, Control systems, Theses.

A Hewlett Packard 8410S (Option 310) Microwave Network Analyzer System and the input/output interface to a Wang 600-14 Programmable Calculator are described. The original design of a digital to analog interface between the Wang 600-14 Calculator and a HP 8690B Sweep Oscillator is presented. Two system software programs which implement automatic S-parameter data collection and either external data storage or data reduction and display are described and documented. (Author)

AD-A040 615/7CP PC **A02**/MF **A01**
California Univ Santa Cruz
Respecifying the Telegram Problem
W. M. McKeeman. 2 Feb 77, 16p Rept no. 77-2-001
Contract N00014-76-C-0682
Presented at the Meeting of the International Federation of Information Processing Societies (Annual), in Dec 76 held at St. Pierre de Chartreuse (France).

Descriptors: *Telegraph systems, Computer programming, Computer programs, Buffer storage, Grammars, Compilers, Specifications, errors, Symbols.
Identifiers: *Structured programming, *Telegrams, Parsing.

The telegram problem was initially proposed as a programming exercise suitable for beginning students. A number of solutions have been published, all containing errors. In this paper the trouble is traced to the original specification and offer a new version. The most significant difference is the use of a grammatical notation for some parts of the specification. The new specification is then followed to a new solution. The concusion is that the new specification is of higher quality, but not different in kind from the original.

AD-A040 675/1CP PC **A06**/MF **A01**
Bolt Beranek and Newman Inc Cambridge Mass
The Interface Message Processor Program
Mar 77, 119p Rept no. Technical Information-89
Contract DAHC15-69-C-0179, F08606-73-C-0027
Supersedes report dated Jun 76, AD-A025 358.

Descriptors: *Computer communications, *Communications networks, *Message processing, *Computer programs, Interfaces, Packets, Core storage, Communication satellites, Maps, Routing, Communications traffic, Communication switching centers, Formats.
Identifiers: ARPA computer network, Interface message processors, Protocols.

The ARPA Network has been in operation for almost eight years and has become an international facility. The network has grown to more than sixty sites spread across the continental United States, plus satellite connections to Hawaii, Norway, and England, and is steadily growing; approximately one hundred independent computer systems of varying manufacture are interconnected. Provision has been made for terminal access to the network from sites which do not enjoy the ownership of an independent computer system. Implementation of the IMPs required the development of a sophisticated computer progam. This program has been previously described in. As stated then, the principal function of the IMP program is the processing of packets, including the following: segmentation of Host messages into packets; receiving, routing, and transmitting store-and-forward packets; retransmitting unacknowledged packets; reassembling packets into messages for transmission into a Host; and generating RFNMs and other control messages. The program also monitors network status, gathers statistics, and performs on-line testing.

AD-A040 772/6CP MF **A01**
Harris Corp Melbourne Fla Electronic Systems Div
Fiber Optics Design Aid Package
Final technical rept.
I. B. Slayton, D. J. Estapa, J. R. Jones, and C. R. Patisaul. May 77, 201p RADC-TR-77-163
Contract F30602-76-C-0246
Supplement to Rept. no. RADC-TR-75-187 dated Jul 75, AD-A016 846.
Availability: Microfiche copies only.

Descriptors: *Fiber optics, *Optical communications, *Computer programs, Data links, Analog systems, Digital systems, Data transmission systems.
Identifiers: Performance evaluation.

This report contains a computer based program which will provide for system level and component level performance analysis for point to point fiber optic communication links. It enables the user to optimize various aspects of a fiber optic communication link for either analog or digital transmission. (Author)

AD-A040 813/8CP PC **A03**/MF **A01**
Naval Underwater Systems Center New London Conn New London Lab
Constant-Q Spectral Analysis by Means of an Approximate Fast Fourier Transform Technique
Technical rept.
William F. Michael, Jr. 7 Apr 77, 46p Rept no. NUSC-TR-5585

Descriptors: *Fast Fourier transforms, *Signal processing, Spectral energy distribution, Q factors, Sidelobes, Bandwidth, Computer programs.

A technique for achieving constant-Q spectral analysis by means of an approximate fast Fourier transform (FFT) is presented. Some underlying theory of the approximate FFT and of constant-Q spectral analysis is given. The benefits and drawbacks of this technique are presented. Initial outputs of the technique from a FORTRAN-based Univac 1108 program show that this technique for constant-Q spectral analysis works, and they also illustrate some of the basic characteristics of constant-Q spectral analysis. (Author)

AD-A040 926/8CP PC **A03**/MF **A01**
Electronics Engineering Group (1842nd) Richards-Gebaur AFB Mo
Design Specification for AFCS Universal Performance Assessment and Control System
Final rept.
David R. Wortendyke, and Richard J. Steele. 17 Mar 77, 36p Rept no. 1842 EEG/EEIMM-TR-77-17

Descriptors: *Computer applications, *Communications networks, *Minicomputers, *Computer program documentation, *Control systems, Monitors, Real time, Computer programs, Communication satellite terminals, Interfaces, Data acquisition, Performance(Engineering), Specifications.
Identifiers: Computer networks, Computer software, Design.

A prototype data acquisition system that utilizes commercial software and hardware design concepts, for use in the development of performance monitoring systems of communication networks, has been designed, assembled, and checked out for the use of the USAF/AFCS. This document provides the design specifications for this universal performance assessment and control system (UPACS). Features emphasized are the use of a real-time software operating system, distributed processing, and the IEEE 488-1975 Digital Interface for Programmable Instrumentation. A centralized minicomputer controls multiple distributed satellite processors by means of a multipoint asynchronous telemetry channel. All data acquisition takes place at the satellite terminals by controlling data acquisition devices connected to the IEEE 488 interface. A detailed description is given of hardware and operating system software. No specific data acquisition software is discussed. (Author)

AD-A040 948/2CP MF **A01**
Sachs/Freeman Associates Inc Hyattsville Md
High Frequency (HF) Amplitude Modulation (AM) Signal-to-Interference Ratio (SIR) Study
E. R. Freeman, and H. M. Sachs. Sep 75, 24p
Contract N00173-76-M-7904
Availability: Microfiche copies only.

Descriptors: *Radio equipment, *Radiofrequency interference, *Information theory, Amplitude modulation, Signal to noise ratio, Audio frequency, High frequency, Radio signals, Probability, Standard deviation, Computer programs, Digital computers, Voice communications, English language.

The objectives of this study are to determine reasonable S/I ratios for high frequency audio modulation (HF AM) Navy Tactical communications, to compare these ratios with current International Frequency Registration Board (IFRB) specifications, and to determine the effects of modifying the SIR's. The approach taken was to develop a mathematical model capable of relating signal, noise, interference and probability of achieving required Signal-to-Noise Ratios (SNR's) and Signal-to-interference Ratios (SIR's).

AD-A040 994/6CP PC **A04**/MF **A01**
Threshold Technology Inc Delran N J
Voice Input Code Identifier (VICI)
Final technical rept.
Phillips B. Scott. Jun 77, 67p RADC-TR-77-190
Contract F30602-75-C-0111

Descriptors: *Speech recognition, *Pattern recognition, *Phonetics, *Word recognition, Acoustics, Voice communications, Security, Identification systems, English language, Telephone systems, Automatic, Computer programs.
Identifiers: BISS(Base and installation security system), Base and installation security system, VICI(Voice input code identifiers), Voice input code identifiers.

This report describes the development, operation and performance characteristics of an improved Advanced Development Model of a Voice Input Code Identifier (VICI). The VICI is an isolated word recognition system capable of recognizing the English digits and four control words, CANCEL, ERASE, VERIFY and TERMINATE. The improved VICI system is based upon equipment previously developed under Contract F30602-74-C-0171. This original VICI system was intended for use by male talkers only and required wide bandwidth speech data input. The advanced development model is capable of operation with input speech which has been limited to telephone bandwidth. It will accept digits and control words as spoken by either male or female talkers. No training of the system by a speaker is necessary. By the use of an alpha-numeric output display, a speaker using the system can verify that each digit spoken into the system was correctly recognized. Errors can be corrected through the use of the control words. In addition, the system can detect and correct many single digit errors which occur within six digit code groups. This error correction algorithm uses check digits which are included in the code groups to detect errors. The system then corrects the errors when possible or requests a reentry of the data by the talker. A speaker dependent software package also was developed which provides for the recognition of up to 200 words.

AD-A041 186/8CP PC **A06**/MF **A01**
Charles Stark Draper Lab Inc Cambridge Mass
Development of a Hierarchical, Dynamically Reconfigurable Input/Output Network
Master's thesis
James R. Seeley. Jun 77, 111p Rept no. T-644
Contract N00014-76-C-0502, Grant NSF-DCR-74-24116

Descriptors: *Communications networks, Message processing, Microprocessors, Algorithms, Computer programs, Control systems, Reliability(Electronics).
Identifiers: *Computer networks, Theses.

This thesis traces the development of the hierarchical, dynamically reconfigurable, input/output network which has been constructed at the Draper Laboratory. It presents a summary of the design procedures used in determining the network architecture, communication methods, message formats, and overall topology. Further, it describes both the hardware and software features that have been implemented in the network's microprocessor-based nodes. In addition, the centrally located software algorithms developed to configure, repair, and monitor the network have been extensively discussed. Finally, the thesis also includes a reliability analysis of the network in a typical application, and a performance evaluation of the effectiveness of the configuration and control programs.

AD-A041 314/6CP MF **A01**
Lehigh Univ Bethlehem Pa Dept of Industrial Engineering
Extensions of Stochastic Network Theory to Facilitate the Development of MOE's for Communication Systems
Final rept.
Gary E. Whitehouse, and John J. Fagan. 1977, 122p Rept no. IE-77-OR-1
Contract N00014-76-C-0900
Availability: Microfiche copies only.

Descriptors: *Communications networks, *Communication switching centers, Network flows, Switching circuits, Stochastic processes, Message processing, Computerized simulation, Voice communications, Data links, Computer programs, FORTRAN.
Identifiers: Message switching, Packet switching.

Recent advances in computer-communications technology have given rise to the development of large, complex data communication networks. The high cost of developing and operating these networks have prompted researchers to search for appropriate measures of network performance. Techniques must be made available to analyze network design alternatives in terms of these performance measures. Researchers, however, have found it particularly difficult to develop analytical techniques that will effectively account for all of the complexities inherent in modern computer-communication networks. Consequently, many analysts have turned to simulation as an alternative. This report shows how certain simulation techniques can be used to estimate performance measures for various types of communication networks. Communication networks may be conveniently classified into three types as follows: (1) Circuit-Switched, (2) Message-Switched, and (3) Packet-Switched.

AD-A041 457/3CP PC **A09**/MF **A01**
Defense Communications Engineering Center Reston Va
System Integration and Interface Transition Issues
Technical rept.
Mar 77, 192p Rept no. TR-2-77

Descriptors: *Telecommunication, *Global communication systems, Secure communications, Interfaces, Integration, Systems engineering, Voice communications, Digital systems, Stability, Data transmission systems, Cryptography, Costs, Computer program documentation.
Identifiers: Computer networks, Computer software.

This Technical Report documents systems engineering and analysis in support of the DCS Plan FY 80/90. Transition issues regarding system integration and interfaces among subsystems are treated. Six system-level issues perceived as the most critical are defined and analyzed. The most critical and the most promising areas for continuing studies are recommended. (Author)

AD-A041 630/5CP PC **A07**/MF **A01**
California Univ Los Angeles Campus Computing Network
An Implementation of the MSG Interprocess Communication Protocol
Semi-annual technical rept. 1 Jul-31 Dec 76
L. P. Rivas, H. C. Ludlam, and R. T. Braden. May 77, 137 Rept no. CCN/TR12
Contract MDA903-74-C-0083, ARPA Order-2543

Descriptors: *Computers, *Message processing, *Computer communications, Data processing terminals, Machine coding, Networks, Memory devices, Debugging(Computers), Interfaces, Access, Batch processing, Computer programming, Computer programs, Computer logic, Computer program documentation.
Identifiers: *Computer networks, Computer software, ARPA computer network, Protocols.

This report covers technical development at UCLA-CCN relating to the National Software Works (NSW), during the period July 1, 1976, through December 31, 1976, and is specifically concerned with the CCN implementation of MSG, the interprocess communication mechanism for the NSW. MSG is a message-oriented protocol which also provides subsidiary connection-oriented facilities. PL/MSG, the process-callable interface to CCN's MSG, is an access method designed particularly for use by PL/I programs. The later sections of the report describe the internal design and logic of the CCN implementation, in increasing detail and specificity.

AD-A041 759/2CP PC **A03**/MF **A01**
Threshold Technology Inc Delran N J
Alpha/Numeric Extraction Technique Phase II
Final technical rept.
Phillips B. Scott. May 77, 35p RADC-TR-77-184
Contract F30602-76-C-0309

Descriptors: *Speech recognition, *Man computer interface, *Word recognition, Alphanumeric data, Phonetics, Acoustic data, Digitizers, Bathymetry, Position(Location), Depth, Plotters, Voice communications, Microphones, Speech, Preprocessing, Syntax, Vocabulary, Hydrographic surveying, Minicomputers, Computer programs, Subroutines, Flow charting.
Identifiers: Nova 1200 computers, Speech understanding systems.

This report describes a 2-part program (1) to interface an existing word recognition system (WRS) to a bathymetric digitizer and (2) to develop a new word recognition system for a large vocabulary. The first program provides an improved means for entering bathymetric readings from smooth sheets to punched cards. The WRS allows a cartographer simultaneously to obtain X-Y coordinate locations and provide voice data entry of depth reading for each coordinate location. With the operator's hands free to concentrate on the X-Y position sensing cursor he can speak the depth numbers. If they are correctly recognized, he can enter them onto punched cards without losing sight of the smooth sheet. The cartographic WRS which was interfaced to the digitizer is described in AD-B008 303L. The complete system has been installed at the Defense Mapping Agency Hydrographic Center at Suitland, MD. The large vocabulary WRS will be used to explore other cartographic applications. This system is based upon the VIP-100, a WRS system with capability of recognizing up to 200 separate words in a syntactic structure. The structure allows up to 30 words in any node of the structure.

AD-A042 145/3CP PC **A07**/MF **A01**
Purdue Univ Lafayette Ind School of Electrical Engineering
Microprocessor Utilization in Communications System Monitoring
Phase rept.
J. J. Kirby, R. A. Meyer, and S. C. Crist. Jun 77, 136p RADC-TR-77-218
Contract F30602-75-C-0082
Prepared in cooperation with Clarkson Coll., Potsdam, N. Y. Dept. of Electrical and Computer Engineering.

Descriptors: *Microprocessors, *Communication and radio systems, *Electromagnetic compatibility, *Communications networks, Monitoring, Europe, West Germany, Computer programs, Digital systems, Voice communications, Radio links, Transistor transistor logic.
Identifiers: European Defense Communications System.

This report illustrates how a microprocessor may be used to monitor the operating performance of the Frankfurt-Koenigstuhl-Vaihingen (FKV) area of the European Defense Communications System (EDCS). Specifically described are the interfaces and software routines necessary to carry out the monitoring function and the advantages and limitations of the proposed microprocessor system. Background information is also given which describes various monitoring methods previously suggested for EDCS. Also described are the various communications devices which are deployed in the FKV area and a non-microprocessor-controlled monitoring system which is currently proposed for that area. (Author)

AD-A042 146/1CP PC **A05**/MF **A01**
National Aviation Facilities Experimental Center Atlantic City N J
Air Traffic Control Experimentation and Evaluation with the NASA ATS-6 Satellite. Volume II. Demonstration of Satellite-Supported Communications and Surveillance for Oceanic Air Traffic Control
Final rept. Sep 74-Apr 75
Francis W. Jefferson. Apr 76, 90p FAA-NA-75-64, FAA/RD-75/173-2
See also Volume 3, AD-A041 863.

Descriptors: *Air traffic control systems, *Communication satellites, *Data transmission systems, *Voice communications, L band, Simulation, Computer programs, Surveillance, Oceans.
Identifiers: ATS-6 satellite, ATS-5 satellite.

Demonstrations of satellite-supported communications for application to oceanic air traffic control (ATC) were conducted as part of an international ATS-6 L-band satellite test program. The ATC demonstrations were comprised of two phases: demonstrations conducted solely for United States (U.S.) Department of Transportation Federal Aviation Administration purposes and demonstrations conducted as a joint effort between U.S., European Space Agency (ESA), and Canada. Voice, data, and dependent surveillance communications between air traffic controllers at a ground terminal and pseudopilots in two airborne aircraft, FAA KC135 and ESA COMET IV, were performed via the ATS-6 satellite and Rosman ground station. A simulated aircraft terminal located at Rosman was also employed. Each terminal provided up to six simulated data link aircraft, through computer software, for traffic loading purposes. Canada provided a voice-only simulated aircraft terminal located in Ottawa. Voice and data scenarios were used to create simulated air traffic. Results were: Dependent ATC surveillance was demonstrated through data link automatic aircraft position reports; position data were obtained from an inertial navigation system in the KC 135 and an Omega navigation system in the COMET; and to a limited extent, independent surveillance was demonstrated using the NASA PLACE system and the ATS-6 and ATS-5 satellites. (Author)

AD-A042 467/1CP PC **A04**/MF **A01**
Stelma Telecommunications Stamford Conn
AN/TSQ-84 Upgraded Components
Final rept. Jul 74-Dec 76
R. H. Geist. Feb 77, 72p ECOM-74-0472-F
Contract DAAB07-74-C-0472

Descriptors: *Communication switching centers, *Tactical communications, *Communication equipment, Computers, Computer programs, Environmental tests, Monitoring, Consoles, Multiplexing, Radio equipment, Telephone lines.
Identifiers: AN/TSQ-84, Army Tactical Communications Systems Patching Facility, Technical control.

This final technical report on the AN/TSQ-84A upgraded components provides a physical and functional description of the equipment as well as a description of the software program supplied for the ROLM 1602 computer. Also included is a description of the environmental tests that the equipment was subjected to and recommendations for future changes/additions. (Author)

AD-A042 740/1CP PC **A03**/MF **A01**
University of Southern California Marina Del Rey Information Sciences Inst
The ARPANET/TENEX Primer and the MSG Message Handling Program
Technical manual
Chloe Holg. Apr 77, 30p Rept no. ISI/TM-77-4
Contract DAHC15-72-C-0308, ARPA Order-2223

Descriptors: *Networks, *Message processing, Text processing, Computer programs, Programming manuals, User needs, Data processing terminals, Computer files, Access, Interfaces, Parity, Duplexers.
Identifiers: *ARPA Computer network, Computer networks, TENEX system, Host computers, MSG Computer program.

This is a basic primer-like manual discussing the operation of the ARPANET, the TENEX operating system, and the MSG message handling program for novice computer users. (Author)

AD-A043 252/6CP MF **A01**
Scope Electronics Inc Reston Va
Voice Control Systems for Airborne Environments
Final technical rept. 5 Jan 76-4 Jan 77
Hill Montague. Jun 77, 95p 6205-0377, RADC-TR-77-189
Contract F30602-76-C-0127
Availability: Microfiche copies only.

Descriptors: *Speech recognition, *Acceleration, *Stress(Physiology), *Flight, *Voiceprints, Airborne, Fighter aircraft, Algorithms, Digitizers, Vocoders, Centrifuges, Masks, Face(Anatomy), Acoustics, Computer programs, Digital filters.
Identifiers: Face masks, Word recognition.

The effects of g-force stress on human voice patterns were investigated with the objective of finding means for making isolated word recognition word devices work in the fighter aircraft cockpit environment. Data were taken in a human centrifuge with SCOPE Electronics Inc's Voice Data Entry System (VDETS) used to prompt and pace the subjects. Data were subsequently digitized and stored for analysis and recognition experiments using the VDETS algorithm with a number of variations. Recognition performance on the centrifuge data was initially poor. Means were found for improving it substantially through modifications to the VDETS algorithm and through preprocessing techniques. VDETS modifications included increased coding resolution, improved segmentation techniques and provision for multimode training. Breathing noise elimination and inverse filtering preprocessing routines were effective. Variations in spectral characteristics with g-force stress were found, but no consistent pattern was discerned. The effectiveness of the inverse filtering led to the conclusion that the major problem was the face mask worn by the subjects, causing a variable element in the acoustic transmission path. Additional work will be required to eliminate face mask effects. (Author)

AD-A043 395/3CP PC **A13**/MF **A01**
Harris Corp Melbourne Fla Electronic Systems Div
Cross Polarization Techniques Investigation
Final technical rept. 20 Sep 75-21 Jan 77
C. A. Baird, and G. Pelchat. Jul 77, 282p RADC-TR-77-244
Contract F30602-76-C-0041

Descriptors: *Data links, *Microwave communications, *Cross correlation, Line of sight, Digital systems, Models, Coupling(Interaction), Networks, Computerized simulation, Computer programs.
Identifiers: *Digital communications, Polarization, Radio links, MW line of sight communication.

The major objective of the cross polarization techniques investigation was to investigate the use of cross polarization to expand the bandwidth efficiency over line-of-sight (LOS)digital microwave links in the Defense Communications System (DCS) and to develop techniques that will improve the cross polarization utility. Cross polarization offers an additional approach, other than improved bandwidth efficient modulation techniques, to double bandwidth efficiency by transmitting independent information on orthogonal polarized channels which use identical frequency bands.

AD-A043 560/2CP PC **A02**/MF **A01**
California Univ Berkeley Dept of Electrical Engineering and Computer Sciences
Research in Integrated, High-Frequency Communication Circuits
Final rept. 1 May 74-30 Apr 77
R. G. Meyer, and D. O. Pederson. Jul 77, 8p ARO-12131.6-EL
Grant DAHC04-74-G-0151

Descriptors: *Integrated circuits, *Communication equipment, *Low noise amplifiers, *Voltage controlled oscillators, High frequency, Broadband, Monolithic structures(Electronics), Transistor amplifiers, Distortion, Avalanche diodes, Computer aided design, Computer programs.
Identifiers: Noise figure, Zener diodes.

This report summarizes our research results in Integrated, High-Frequency Communication Circuits. A monolithic integrated circuit process giving 1.7 GHz transistors has been realized. This allowed realization of an optimum, wideband, low-distortion, monolithic amplifier with 20 dB gain and 370 MHz bandwidth. The circuit incorporates low-noise Zener diodes and has a worst case noise figure of 9 dB. Research on monolithic VCOs yielded an optimum topology for a temperature-stable high-frequency VCO. A monolithic triangle sine wave converter yielding 0.3% total harmonic distortion over a 70 deg C temperature range has been realized for use with such VCOs. A computer-aided design program SINC-S has been written for the analysis of oscillator circuits. This typically gives a factor of three improvement in computation time compared with conventional techniques. (Author)

AD-A044 256/6CP PC **A03**/MF **A01**
National Aviation Facilities Experimental Center Atlantic City N J
Simulation Model for Air Traffic Control Communications
Final rept.
Robert Mulholland. Jul 77, 35p FAA-NA-76-30, FAA/RD-77/69

Descriptors: *Air traffic control systems, *Communication and radio systems, *Computerized simulation, Air traffic control terminal areas, Simulation languages, Computer programs, Aircraft landings, Altitude, Input output processing, Arrival, Takeoff, Ground controlled approach radar, Pilots, Air traffic controllers.
Identifiers: GPSS programming language, Fortran 4 programming language.

A computer simulation model designed to mimic second-by-second behavior of air/ground communications in an air traffic control sector is described. The model can be used to simulate any one of nine sector functions (e.g., high-altitude enroute, low-altitude transitional, radar-arrival control, etc.). The model exists as a computer program written in the GPSS V and FORTRAN IV languages. Input variables include aircraft arrival rate into sector, distribution of transmission length, distribution of number of transmissions in an air/ground exchange, etc. Response variables include sector aircraft loading, channel utilization, and communications delay. Model output can be obtained in the form of time series (e.g., minute-by-minute averages of channel utilization) exhibiting the dynamics of sector communications or simple averages of such series taken over several hours of simulated time. (Author)

AD-A044 419/0CP PC **A09**/MF **A01**
University Coll London (England) Dept of Statistics and Computer Science
University College London ARPANET Project
Annual rept. 1 Jan-31 Dec 76
Peter T. Kirstein. Feb 77, 188p Rept no. TR-34
Contract N00014-74-C-0280, Grant N00014-77-G-0005

Descriptors: *Communications networks, *Data transmission systems, Satellite networks, Minicomputers, Computer programs, Computer files, Communication satellite terminals, Communication switching centers, Front end processors, Great Britain, Coding, Message processing, Time sharing, Data processing, Multichannel communications.
Identifiers: *Computer networks, *ARPA computer network.

Research activities covered in this document include the interconnection of hosts and networks, the development of a system SWITCH for virtual network connection, and our connction to the UK Post Office Experimental Packet Switched Service. Two topics covered in particular detail are the packet satellite project and the Transmission Control Program (TCP) experiments. These have particular relevance to other ARPA supported projects and so are treated in space depth. Finally, our measurement and facsimile activities are described, and UK use of ARPANET through the ULC TIP is evaluated. A list of conclusions that may be drawn from our research activities during 1976 is given at the end of the report. (Author)

AD-A044 605/4CP PC **A07**/MF **A01**
Dialog Systems Inc Cambridge MA
Key Word Classification
Final technical rept.
S. L. Moshier, P. N. Leiby, and R. E. Smith. Aug 77, 148p RADC-TR-77-122
Contract F30602-75-C-0171

Descriptors: *Speech recognition, *Signal processing, *Word recognition, Computer programs, Algorithms, Statistical data, False alarms.
Identifiers: Key words, Speech processing, Real time.

This report summarizes the development of a real-time key word recognition. The basic objectives for the system were the ability to detect one or more key words in continuous speech, independent of the speaker. By concentrating half-syllable sized utterances in sequence to detect the occurrence of a spoken work, good temporal registration was obtained and with good recognition results. On a limited number of talkers (about ten) results of 90% - 95% detection and 4-6 false alarms per hour were obtained. When the data base is increased to approximately fifty talkers, the results obtained are 85% detection and 20-25 false alarms per hour. The techniques and hardware developed under this effort appear very promising. Improvements appear feasible with only modest changes. (Author)

AD-A045 083/3CP PC **A05**/MF **A01**
Decisions and Designs Inc Mclean Va
Decision Analysis as an Element in an Operational Decision Aiding System (Phase IV)
Contract technical rept. 1 Jul 76-28 Feb 77
Cameron R. Peterson, Lawrence D. Phillips, L. Scott Randall, and William H. Shawcross. Apr 77, 79p Rept no. PR-77-4-6
Contract N00014-74-C-0263
See also Phase 3, AD-A034 037.

Descriptors: *Command and control systems, *Decision making, *Naval operations, *Computer graphics, Interactive graphics, Prototypes, Computer programs, Computer applications, Threat evaluation, Risk analysis, Statistical inference, Bayes theorem, Hierarchies, Mission profiles.

This paper reports the results and status of continuing investigations to the Navy's operational decision environment. Focus has remained on the development of prototype decision aids in a computer-graphic form as an element of a larger command and control system serving the tactical support needs of operational commanders and their staffs. Several decision aid specifications as well as several software implementations have been developed. An initial prototype aid is designed to cope with uncertainty and employs probabilistic inference and multiple-value criteria. This prototype has been designated TACAID and is currently in a demonstration mode at the Project testbed.

AD-A045 452/0CP PC **A07**/MF **A01**
Honeywell Inc St Petersburg Fla
Security Kernel Specification for a Secure Communications Processor
C. H. Bonneau. Sep 76, 148p ESD-TR-76-359
Contract F19628-74-C-0193

Descriptors: *Data processing security, *Communication equipment, *Secure communications, Kernel functions, Security, Interfaces, Minicomputers, Specifications, Computer programs, Modules(Electronics).
Identifiers: Honeywell-6/40 computers.

This report presents a formal top level interface specification of a kernel for a secure communications processor based on a Honeywell Level 6/40 minicomputer enhanced with a security protection module (SPM). (Author)

AD-A045 673/1CP PC **A06**/MF **A01**
University of Southern California Marina Del Rey Information Sciences Inst
A Research Program in Computer Technology
Annual technical rept. Jul 76-Jun 77.
Sep 77, 115p Rept no. ISI/SR-77-8
Contract DAHC15-72-C-0308, ARPA Order-2223

Descriptors: *Computer programs, *Interactive graphics, *Command and control systems, *Secure Communications, Digital computers, Communications networks, Communication and radio systems, Global, Information systems, Automation, Microprogramming, Time sharing.
Identifiers: *ARPA computer network.

This report summarizes the research performed under Contract DAHC15-72-C-0308 by USC/Information Sciences Institute from 1 July 1976 to 30 June 1977. The research is aimed at applying computer science and technology to areas of high DoD/military impact. The ISI program consists of eleven research areas: Program Verification - logical proof of program validity; Information Automation - development of a user-oriented message service for large-scale military requirements; Specification Acquisition from Experts - the study of acquiring and using program knowledge for making informal program specifications more precise; Network Secure Communication - work on low-bandwidth secure voice transmission using an asynchronous packet-switched network; Command and Control Graphics - development of a device-independent graphic system and graphics-oriented command and control applications programs; Programming Research Instrument - development of a major time-shared microprogramming facility; Protection Analysis - methods of assessing the viability of security mechanisms of operating systems; Distributed Sensors Network - developing algorithms and communication protocols to support the operation of geographically distributed sensors; Packet Radio Terminal Mockup - development of a mockup of a minimum-size, low-power display terminal to illuminate human factors issues in portable environments; User-Dedicated Resource - assistance to an documentation for ARPANET users worldwide; and ARPANET TENEX Service - operation of TENEX service and continuing development of advanced support equipment. (Author)

AD-A045 721/8CP PC **A10**/MF **A01**
Duke Univ Durham N C Dept of Electrical Engineering
EQN Models for the Analysis and Design of a Computer Network of Functionalized Processors
Final rept. 15 Jul 76-30 Aug 77
Robert L. Leech. 30 Jul 77, 204p ARO-14533.1-A-EL
Grant DAAG29-76-G-0309
Doctoral thesis.

Descriptors: *Computer programming, *Queueing theory, Networks, Computer architecture, Exponential functions, Hierarchies, Parallel processing, Man computer interface, Data processing terminals, Data management, Data bases, Command and control systems, Computerized simulation, Trade off analyses, Fault tolerant computing, Computer programs, Theses.
Identifiers: *Computer networks, Data base management systems.

Network Queuing Theory is used to establish three Exponential Queuing Network (EQN) models of computer network systems. A projected computer network is based on the specification of processing functions for model representation. Example functions used in this work are computation, data base management, communications and terminal/access interface as would be applicable to a military command and control computer system. The models may be used for trade-off analysis of critical performance criteria. Additionally, a basic method for the synthesis/determination (design) of processor 'computer power' to ensure a load balanced network is ascertained. The three models and their respective computer network evaluations for trade-off analysis are pursued with their inherent advantages and disadvantages. All three models accommodate job routes (types) with one model providing exact solutions for each job type. These models accommodate large numbers of jobs so that an effective total computer network may be modelled.

AD-A045 832/3CP PC **A06**/MF **A01**
Applied Psychological Services Inc Wayne Pa Science Center
A Computer Model for Simulation of Message Processing in Military Exercise Control and Evaluation Systems
Final rept. Sep 75-Sep 76
Arthur I. Siegel, William Rick Leahy, and J. Jay Wolf. Oct 77, 119p ARI-TR-77-A22
Contract DAHC19-76-C-0013

Descriptors: *Computerized simulation, *Message processing, *Communications networks, *Human factors engineering, Systems analysis, Stochastic processes, Models, Radio operators, Computer programs, Model theory, Military intelligence.
Identifiers: NETMAN model.

This report describes a digital computer model, NETMAN, and its implementation for simulating the information processing in a semi-automated system with Army personnel during field exercises, using a computer based message handling system. The NETMAN model was designed to allow simulation of message processing in a system composed of up to three networks. Each network may be composed of up to nine referees, up to nine radio operators, and one controller. One computer is assumed to accommodate the three networks. As such, the model allows simulation and test of the effects on system effectiveness of varying such aspects as: number of referees, number of networks, task procedures, message arrival rate, message length, and operator skill. The results of the simulation are interpretable in terms of a number of formal effectiveness measures (accuracy, thoroughness, responsiveness, completeness) and an overall effectiveness index. Additionally, the results are interpretable in terms of such model results as work time, stress imposed, message processing time, errors, number of messages processed, and fatigue. The appendices contain flowcharts, data item information, individual definitions for each model subroutine, and input-output formats. This information is organized to serve as a user's manual for those who wish to apply the model for simulation. (Author)

AD-A045 899/2CP PC **A02**/MF **A01**
Northwestern Univ Evanston Ill Dept of Electrical Engineering
Graph Theory and Combinatorics with Applications to Digital Systems and Networks
Summary rept. 1 Jul 76-30 Jun 77
S. L. Hakimi. Aug 77, 9p AFOSR-TR-77-1247
Grant AFOSR-76-3017

Descriptors: *Communications networks, Computer applications, Digital systems, Combinatorial analysis, Graphs, Optimization, Machine coding, Algorithms, Computer programs, Sequences(Mathematics), Heuristic methods, Research management, Reports.
Identifiers: Graph theory, Combinatorial analysis, Variable length coding, *Computer networks.

The research problems successfully considered during the past year can be broadly classified into four areas: Communication Networks, Variable Length Codes; Digital Systems and Computer Applications, and Topics in Pure and Applied Graph Theory.

AD-A046 273/9CP PC **A07**/MF **A01**
University of Southern California Marina Del Rey Information Sciences Inst
State Deltas: A Formalism for Representing Segments of Computation
Research rept.
Stephen D. Crocker. Oct 77, 128p Rept no. ISI/RR-77-61
Contract DAHC15-72-C-0308, ARPA Order-2223

Descriptors: *Computer program verification, *Message processing, Interfaces, Test methods, Computer logic, Information processing, Networks, Interequipment communication, Minicomputers, Validation, Checkout procedures, Accuracy, Network flows.
Identifiers: ARPA computer network, State deltas, Computer networks, Interface message processors, Interface message processors.

A state delta is a first-order predicate taking a precondition, a post-condition, a modification list and an environment list. State deltas are to be used in a proof system in which predicates describing the machine's current state are cross-referenced by the locations containing values used in each. Reasoning about a machine's forward progress may be carried out by successive application of state deltas. Application is legal if the precondition is true and if none of the locations in the environment list has been changed since the state delta was entered into the system. Afterward, all predicates cross-referenced to any of the locations in the modification list are deleted, and those in the post-condition list are added to form a new current state. If some locations hold arrays or lists, the cross-referencing part of the system may provide for attaching predicates to location components. If names may be given to individual location components, different predicates may depend upon the same values under different names. To keep track of all overlap conditions possible among a set of named locations, a graph structure with two node types is used to show all possible overlaps. A small proof system has been built and used to prove the correctness of a slice of the code in the ARPANET IMPs.

AD-A046 580/7CP PC **A02**/MF **A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
Development of a Discrete Address Beacon System
Quarterly technical summary rept. no. 22, 1 Apr-30 Jun 77.
1 Jul 77, 23p FAA-RD-77-107
Contract DOT-FA72WAI-261

Descriptors: *Air traffic control systems, *Radar beacons, *Transponders, Data links, Communication equipment, Surveillance, Computer programs.
Identifiers: *Discrete address beacon systems.

This is the twenty-second Discrete Address Beacon System Quarterly Technical Summary. Included are the results to date of analytical studies, laboratory and flight experiments, and software developments supporting the concept feasibility and performance definition phase of the FAA DABS Program.

AD-A046 755/5CP PC **A02**/MF **A01**
National Aviation Facilities Experimental Center Atlantic City N J
Executive Summary: New York City Pilots Automatic Telephone Weather Answering Service (PATWAS) Test
Final rept. Aug 75-Jul 76
Frank Staiano, and Ephraim Shochet. Oct 77, 14p FAA-NA-77-23, FA/RD-77/80

Descriptors: *Weather communications, *Information centers, *Telephone systems, Performance(Engineering), Operational test and evaluation, Pilots, Flight testing, Flight paths, Automatic, Recording systems, Computer programs, Surveys, Questionnaires, New York City(New York), Weather.
Identifiers: Pilots Automatic Telephone Weather Answering Service.

An improved Pilots Automatic Telephone Weather Answering Service (PATWAS) was subjected to a year-long test in the New York City metropolitan area. The improvements consisted primarily of the following: (1) user access to three route-oriented briefings, (2) an increase in the number of access lines to PATWAS, (3) more frequent updating of information, (4) the addition of special early morning recordings, (5) capability to request meteorological and aeronautical information from the Weather Message Switching Center for incorporation into the PATWAS message, (6) reduction in the time required for updating, (7) addition of more meteorological and aeronautical information to the PATWAS message, (8) new and more efficient magnetic tape equipment, (9) installation of an acoustic enclosure for PATWAS tape recording, and (10) more efficient organization of the message format. The purpose of the experiment was to test and evaluate the new PATWAS products, schedules, user acceptance, and the effects on the telephone briefing workload at the flight service station (FSS).

AD-A046 797/7CP PC **A02**/MF **A01**
Naval Research Lab Washington D C
Phase-Difference Processing Incorporating Time-Alignment and Time-Compression Techniques
Interim rept.
Wendell L. Anderson. 10 Aug 77, 15p NRL-8147, SBIE-AD-E000-006
Contract ARPA Order-3874
Supersedes AD-E000 006.

Descriptors: *Signal processing, Phase(Electronics), Time compression, Coherence, Correlation techniques, Time dependence, Doppler effect, Least squares method, Computer programs, Processing, Measurement.
Identifiers: Phase difference, Time alignment.

This report describes a system for measuring the instantaneous phase difference between two signals as a function of time. This system allows the user to apply various time-difference and doppler corrections to the signals in order to obtain minimum (in the least-squares sense) phase difference between the signals. (Author)

AD-A047 042/7CP PC **A04**/MF **A01**
Stanford Research Inst Menlo Park Calif
Investigation of the Use of Frequency-Division Multiple Access for Application with a Mix of User Terminals. Volume I. Summary and Results
Final rept.
Pravin C. Jain, V. Elaine Hatfield, John K. Leung, and D. Thomas Magill. Dec 73, 62p
Contract DCA100-72-C-0033
See also Volume 2, AD-A047 044.

Descriptors: *Communication satellite terminals, *Frequency division multiple access, *Data links, Data rate, Radio transmission, Power levels, Frequency, Errors, Computer programs, Intermodulation, User needs, Limiters, Spread spectrum, Control systems.

This report presents the results of research performed to investigate the application of the frequency-division multiple-access (FDMA) technique for providing a mix of user terminals of differing characteristics--such as data rates, transmitter powers, and receiver sensitivities--with simultaneous access capability to a limiting satellite repeater. A computer program (SYSCON) has been developed to model a PSK/FDMA satellite communication system and to optimize its performance in operation with a mix of user terminals, through selection of power and frequency plans. This capability is achieved through optimization of a norm defined as the weighted sum of the link error rates and representing the figure of merit or a measure of the system's communications performance with respect to both the power and the frequency of the links. To obtain the expression for the error rate at the input of the FDMA links, it was necessary to derive general analytic expressions for the limiter output signal, the intermodulation, and the noise components, when n signals are transmitted simultaneously through the satellite repeater. The report consists of three volumes. Volume One provides a summary of the study which includes a description of the analysis approach, documentation of the pertinent equations, numerical results, and conclusions.

AD-A047 044/3CP PC **A06**/MF **A01**
Stanford Research Inst Menlo Park Calif
Investigation of the Use of Frequency-Division Multiple Access for Application with a Mix of User Terminals. Volume II. Appendices
Final rept.
Pravin C. Jain, V. Elaine Hatfield, and John K. Leung. Dec 73, 106p
Contract DCA100-72-C-0033
See also Volume 3, AD-A047 045.

Descriptors: *Communication satellite terminals, *Frequency division multiple access, *Data links, Intermodulation, Errors, Limiters, Frequency, Power levels, Computer programs, Control systems.

Volume Two comprises three appendices giving detailed analyses of the problem areas in the investigation of the use of FDMA with a mix of user terminals of differing characteristics. Appendix A deals with the limiter transfer characteristic and provides a comprehensive theoretical investigation of the problem of transmitting a number of constant-envelope, phase-modulated FDMA carriers through a limiting satellite repeater. Appendix B analyzes the problem of detection of quadriphase-modulated FDMA carriers at the receiver after transmission through a limiting transponder. An expression for the bit-error probability at the output of an FDMA channel is obtained considering the presence of other FDMA carriers, cross products, and retransmitted up-link as well as down-link noise at the receiver input. Appendix C describes the computer program SYSCON. It also discusses the equations and subroutines used in system optimization. (Author)

AD-A047 045/0CP PC **A09**/MF **A01**
Stanford Research Inst Menlo Park Calif
Investigation of the Use of Frequency-Division Multiple Access for Application with a Mix of User Terminals. Volume III. Multiple-Access Techniques
Final rept.
Pravin C. Jain, V. Elaine Hatfield, John K. Leung, and D. Thomas Magill. Dec 73, 182p
Contract DCA100-72-C-0033
See also Volume 1, AD-A047 042.

Descriptors: *Frequency division multiple access, *Communication satellite terminals, *Data links, Computer programs, Data rate, Antijamming, Timing circuits, Accuracy, Control systems, Power levels, Delay.
Identifiers: Code division multiple access, Time division multiple access, Uplink.

The three major multiple-access techniques are compared for a mix of user types--i.e., differing data rates and capacity quotients. The comparison is made with respect to eight performance criteria that are particularly important for the military environment. A general comparison indicates that frequency-division multiple access (FDMA) performs better than originally believed. A specific test case of 10 accesses with a variety of data rates and capacity quotients is selected for detailed evaluation. The quantitative comparison is based on satellite throughput. The performance of the FDMA system is optimized and evaluated using the computer program SYSCON developed under the other tasks of this study. FDMA is found to offer very nearly as much satellite throughput as the other two multiple-access techniques. Furthermore, FDMA offers the advantages of simplicity, low cost, and compatibility with existing equipment. Based on this example, it is concluded that FDMA can offer substantial advantages as compared to the other techniques. Further, more detailed studies are recommended to fully delineate the region of FDMA superiority. (Author)

AD-A047 105/2CP PC **A03**/MF **A01**
Applied Psychological Services Inc Wayne Pa
A Digital Simulation Model of Message Handling in the Tactical Operations System. III. Further Extensions of the Model for Increased Interaction
Technical rept.
William R. Leahy, Martin R. Lautman, Jon L. Bearde, and Arthur I. Siegel. Oct 77, 40p ARI-TR-77-A25
Contract DAHC19-72-C-0003
See also AD-A047 104.

Descriptors: *Message processing, *Man machine systems, Tactical data systems, Information processing, Digital simulation, Performance(Human), Decision making, Operators(Personnel), Computer logic, Digital computers, Flow charting, Computer programming, Subroutines, Model tests.
Identifiers: MANMODEL computer program.

The present report is the last in a series of three which describe the inner working of MANMODEL, a simulation of the US Army Tactical Operations System (TOS). MANMODEL yields measures of system performance under different mixes of equipment, personnel and procedures. Sensitivity tests of MANMODEL have been successfully completed and are reported here. Formal validation of MANMODEL as a predictor of performance is discussed as a logical next step in its evolution. Model predictions might be validated against obtained data from TOX exercise operations. (Author)

AD-A047 158/1CP PC **A11**/MF **A01**
Comsat Labs Clarksburg Md
Multiple Beam Torus Antenna Study. Volume II
Final rept. Jul 76-Feb 77
William J. English, and Carol Rieger. Mar 77, 238p SBIE-AD-E100-001
Contract DCA100-76-C-0050
Supersedes AD-E100 001. See also Volume 1, AD-A047 157.

Descriptors: *Multiple beam antennas, *Communication satellite terminals, Communication satellites, Antenna apertures, Toroids, Synchronous satellites, Beam steering, Parabolic antennas, Antenna feeds, Wind, Wide angles, Honeycomb cores, Structural mechanics, Sidelobes, Computer programs, Horn antennas, X band.
Identifiers: *Torus antennas, *Satellite communications, Satellite earth terminals, Multifrequency.

Partial contents: Geometrical and Beam Pointing Considerations; Electrical (RF) Performance Characteristics; Mechanical and Structural Characteristics of the Uncorrected Front. Fed MBTA; and Cost Estimates for a Recoverable MBTA.

AD-A047 240/7CP MF **A01**
Rome Air Development Center Griffiss AFB N Y
The Development of a Computer Speech Processing System and Its Use for the Study and Development of Processing Methods for Enhancing the Intelligibility of Speech in Noise
Interim rept. 6 Jun-26 Aug 77
Russell J. Niederjohn, and Robert A. Curtis. Oct 77, 95p Rept no. RADC-TR-77-310
Availability: Microfiche copies only.

Descriptors: *Speech transmission, *Signal processing, *Intelligibility, Optimization, Speech, Spectrum analysis, Computer applications, Background noise, Broadband, Speech analysis, Transformations(Mathematics), Algorithms, Computer programs.
Identifiers: *Speech processing, INTEL(Intelligibility Enhancement by Liftering), Intelligibility enhancement by liftering, Speech intelligibility enhancement, Spectral subtraction, Noise spectra.

This report describes results of an examination of four methods for processing speech so as to enhance its intelligibility in the presence of wideband random noise at the source. The four methods were: (1) INTEL, a method which involves processing in both the first and second order spectral domains; (2) Spectral subtraction, which involves a simple subtraction of the average noise spectrum from the first-order spectrum; (3) Minimum mean square error filtering, which involves filtering speech in such a way as to minimize the mean square error between a signal and its expected value in noise; and (4) Methods based upon suppressing the frequency content of a speech plus noise signal between pitch harmonics of the speech signal. To carry out a study of methods of enhance speech intelligibility in noise, two general-purpose computer processing systems were implemented. The first, a terminal interactive system for generation, analysis, and graphic display of synthetic voiced speech sounds, provided considerable insight into the effect of various processing algorithms upon speech and upon speech in noise. The second computer processing system has been developed for the processing of real speech. It involves use of a DDP-116 data converter and a Honeywell 6000 Computer.

AD-A047 392/6CP PC **A15**/MF **A01**
Bolt Beranek and Newman Inc Cambridge Mass
Communications Oriented Language (COL): Language Definition
Final rept. May 76-May 77
Arthur Evans, Jr, and C. Robert Morgan. 2 May 77, 335p BBN-3534, SBIE-AD-E100007
Contract DCA100-76-C-0051
Supersedes Rept no. BBN-3261-Pt-2, AD-A027 523. See also AD-A047 393.

Descriptors: *Programming languages, *Computer programs, *High level languages, Communications networks, Compilers, Digital computers, Computer communications, Computers.
Identifiers: *COL programming language.

A Communications Oriented Language (COL) is a high order language designed to be maximally effective as a vehicle with which to program communications applications. This document is a description of a design for a COL. The design philosophy and principles that led to the COL are first discussed. Then the language is described, the syntax semi-formally using modified BNF and the semantics informally in English text. Some examples of COL programming are included. An appendix shows how machine-level instructions for a specific machine can be written in the COL, with an example showing interrupt processing.

AD-A047 393/4CP PC **A09**/MF **A01**
Bolt Beranek and Newman Inc Cambridge Mass
Communications Oriented Language (COL): Language Implementation and Usage
Final rept. May 76-May 77
C. Robert Morgan, and Arthur Evans, Jr. 2 May 77, 180p BBN-3533, SBIE-AD-E100006
Contract DCA100-76-C-0051
Prepared in cooperation with Yale Univ., New Haven, CT. See also Rept. no. BBN-3261-Pt-1, AD-A027 519 and Rept. no. BBN-3534, AD-A047 392.

Descriptors: *Programming languages, *Computer programs, *High level languages, Computer Communications, Communication and radio systems, Compilers, Digital computers, Computers.
Identifiers: *COL programming language.

A Communications Oriented Language (COL) is a high order language designed to be maximally effective as a vehicle with which to program communications applications. A hypothetical compiler for a proposed COL is described. (A companion volume describes the COL language). Possible code-generation strategies for three different computer systems are presented.

AD-A047 847/9CP PC **A05**/MF **A01**
Electromagnetic Compatibility Analysis Center Annapolis Md
Automated UHF Frequency Assignment System for FAA Air Traffic Control Communications
Final rept.
Thomas Hensler, and John Morrow. Jun 77, 94p ECAC-PR-77-012, FAA-RD-77-96
Contract F19628-76-C-0017

Descriptors: *Air traffic control systems, *Frequency allocation, *Communication and radio systems, Ultrahigh frequency, Computer programs, Automation, Probability, Radio interference.
Identifiers: Automated Frequency Selection.

An automated UHF Frequency Assignment System (UHF-FAS) was developed as a means of providing frequency assignment plans for FAA Air Traffic Control (ATC) UHF communications facilities. The UHF-FAS consists of a series of computer programs and can be used to investigate the advantages of different frequency assignment strategies (including partial and complete assignments), detect assignments that do not meet the FAA criterion, provide statistical analyses, and plot ATC service volumes. (Author)

AD-A047 918/8CP PC **A04**/MF **A01**
General Research Corp Santa Barbara Calif
The ROSCOE Manual. Volume 20 - Satellite Communication Model
Final rept.
H. S. Ostrowsky, J. R. Garbarino, and J. J. Baltes. Jan 77, 68p CR-1-520-VOL-20, SBIE-AD-E300-046
Contract DNA001-74-C-0182
See also Volume 17, AD-A043 547.

Descriptors: *Nuclear explosions, *Nuclear radiation, *Electromagnetic interference, *Communication and radio systems, *Artificial satellites, Computerized simulation, Standardization, Ionospheric propagation, Ionospheric scintillations, Blackout(Propagation), Radar signals, Phase shift keyers, Propagation, Striations, Scintillation, Computer programs.
Identifiers: *Roscoe computer program, *Satellite communications, Radar propagation, Nuclear effects(Communications), Nuclear effects(Spacecraft).

The ROSCOE computer code is designed specifically to be the laboratory standard for evaluating nuclear effects on radar and optical sensors. The program provides a means for evaluating radar acquisition, discrimination, and tracking performance in a nuclear environment; estimating various radar and optical propagation error sources; and computing specific phenomenological data. Volume 20 of this series describes ROSCOE's satellite communication model. (Author)

AD-A047 999/8CP PC **A07**/MF **A01**
Air Force Avionics Lab Wright-Patterson AFB Ohio
Rooftop Antenna Pointing Program
Final rept. Mar 74-Oct 77
Paul F. Humel. Nov 77, 143p Rept no. AFAL-TR-77-228

Descriptors: *Communication satellites, *Parabolic antennas, *Satellite tracking systems, Computer programs, Installation, Roofs, Aiming, Data processing, Ultrahigh frequency, K band, Ephemerides.
Identifiers: LES-8 satellite, LES-9 satellite, C-135 aircraft.

This document provides a description of the inhouse work performed in the Air Force Avionics Laboratory's Communication Systems Evaluation Laboratory (CSEL) to successfully point a ten-foot dish antenna at any earth orbiting satellite for which ephermeris data is available. Both the hardware and software aspects of the program are covered. (Author)

AD-A048 041/8CP PC **A06**/MF **A01**
McDonnell Douglas Corp St Louis Mo
Advanced Receiver Modeling Methods
Final technical rept. 30 Jun 75-31 Aug 76
Saul Fast. Sep 77, 109p AFAL-TR-76-265
Contract F33615-75-C-1265

Descriptors: *Radio receivers, Model theory, Advanced systems, Frequency synthesizers, Noise(Radio), Degradation, Nonlinear systems, Distortion, Radio interference, Air Force research, Computer programs, Intermodulation, Dynamic range, Intermodulation, Phase locked systems, Spurious effects, Mixers(Electronics).
Identifiers: *Signal propagation paths, Computer applications.

This program develops an advanced methodology to aid the design, test and evaluation of receiver systems. Computer programs were developed for treating receiver performance degradations due to noise, nonlinearities, linear distortion, and signal interference. Specifically, two computer programs were generated for treating receiver processes encountered in signal paths and synthesizers respectively. Signal path computations are made relative to the receiver frequency plan, receiver noise figure and sensitivity performance, second and third order receiver intermodulation intercepts, permissible two sinusoid signal levels and dynamic range performance. Spurious response performance is computed for each spur product type generated at each mixer, yielding the worst case spur frequency and spur signal level at the receiver input and the corresponding worst case set of mixer local oscillator frequencies. Computations are also made of the receiver output waveform response to an essentially arbitrary input signal waveform. Synthesizer program computations are made of the frequency plan, worst case phase modulation of each synthesizer output by spurious products generated at each phase comparator and mixer and worst case phase modulation of each synthesizer output by noise generated on each VCO and in the phase locked loop circuits.

AD-A048 576/3CP PC **A04**/MF **A01**
Mitre Corp Bedford Mass
Design and Abstract Specification of a Multics Security Kernel. Volume I
Technical rept.
W. L. Schiller. Nov 77, 60p MTR-3294-Vol-1, ESD-TR-77-259
Contract F19628-77-C-0001

Descriptors: *Computer communications, *Secure communications, Computer programs, Computer program verification, Input output processing, Information exchange, Data storage systems, Mathematical models, Auditing, Surveillance.
Identifiers: *Multics system, *Security kernels.

On the basis of the recommendations of the ESD Computer Security Technology Panel techniques were developed for the design, implementation, and formal mathematical verification of a security kernel: a hardware and software mechanism to control access to information within a computer system. This three-volume report describes the design of a security kernel for the Honeywell Information Systems Multics computer system. This first volume gives a methodology and design overview. The primary subsystems are defined, and the reasoning behind the design decisions is given. The correspondence of the design to a mathematical model is discussed, giving a preview to the formal verification. The second volume gives a formal top-level specification of the primary subsystems. The third volume deals with the secondary subsystems, including the issues of initialization and reconfiguration.

AD-A048 611/8CP PC **A04**/MF **A01**
Institute for Telecommunication Sciences Boulder Colo
Objective Measurement of Voice Channel Intelligibility
Final rept
K. J. Gamauf, and W. J. Hartman. Oct 77, 75p FAA-RD-77-153
Contract DOT-FA74WAI-448

Descriptors: *Voice communications, *Intelligibility, *Speech recognition, Computer programs, Linear programming, Data bases, Distortion, Signal to noise ratio, Predictions.
Identifiers: Linear predictive coding.

Following the results of a feasibility study (Hartman and Boll, 1976) an objective intelligibility measure is developed using a large data base consisting of 8-50 word phonetically balanced word groups with twelve different kinds of distortion. Justification for the use of this particular measure is included, with mathematical derivations and physical interpretations. A discussion of the feasibility of a hardware implementation of the software developed here is also included. (Author)

AD-A048 769/4CP PC **A03**/MF **A01**
Computer Sciences Corp San Diego Calif
Simulation Code for Underwater Television Systems (SCOUTS)
Research and development rept. 1 Jun 76-1 May 77
Alan Gordon, and Thomas Selden. Sep 77, 44p NOSC-TR-146
Contract N00123-74-C-0312

Descriptors: *Underwater equipment, *Television systems, *Computerized simulation, Fortran, Naval research, Machine coding, Computer programming, Parameters.
Identifiers: Fortran 4 programming language, SCOUTS computer program.

Based on the system performance equations developed in the Naval Undersea Center's NUC TP 303, Handbook of Underwater Imaging System Design, a computer code was written to predict the performance of underwater television systems. This code, known as SCOUTS(for Simulation Code for Underwater Television Systems') is written in FORTRAN IV and is suitable for demand or batch runs. SCOUTS allows the user to select environmental, geometric and hardware parameters. It can be used for system design as well as analysis. SCOUTS includes a parametric mode which allows automatic variation of multiple parameters. A complete source listing is included as an Appendix. (Author)

AD-A048 774/4CP PC **A04**/MF **A01**
RAND Corp Santa Monica Calif
Framework and Functions of the 'MS' Personal Message System
Interim rept.
David H. Crocker. Dec 77, 72 Rept no. RAND/R-2134-ARPA
Contract DAHC15-73-C-0181, ARPA Order-189

Descriptors: *Mail, *Message processing, *Minicomputers, *Communications networks, *Telecommunication, Systems engineering, Computer programs, Message processing.
Identifiers: PDP-11 computers, Electronic mail, PMS(Personal Message System), Personal Message System.

This report describes the design, framework, and functions of a system that enables the manipulation of electronic mail, or messages, for users of PDP-11 minicomputers. In the past, electronic mail was available only to users of larger scale computers. The 'MS' Personal Message System transfers the capabilities of electronic mail technology to the Unix operating system, which runs on the DEC PDP-11 hardware. It consists of several pieces of software to compose, transmit, receive, review, and manipulate messages. The system attempts to provide functions which conform to user's preexisting models of paper based office communications. This report is not a user's manual, but rather a discussion of the functions available, and the issues involved in designing message-processing systems.

AD-A048 846/0CP PC **A05**/MF **A01**
Electro-Voice Inc Buchanan Mich Military Engineering Dept
Linear Noise-Attenuating Earphone
Final rept. 28 May 76-21 Aug 77
R. Ramsey. 4 Nov 77, 98p ECOM-76-0149-F
Contract DAAB07-76-C-0149

Descriptors: *Earphones, Computerized simulation, Flight helmets, Ear protectors, Sound pressure, Noise reduction, Response, Acoustic attenuation, Linearity, Diaphragms(Mechanics), Compatibility, Body fluids, Cushioning, Head(Anatomy), Flight crews, Environmental tests, Computer programs.
Identifiers: Ear cushions, Earcups, H-143 earphones, SPH-4 helmets.

This document covers the technical details of work performed to improve the linearity and attenuation of the earphone and earcup respectively in Flying Type Helmet SPH-4. The results of the effort provide an immersible, salt resistant, rugged and low distortion earphone with a flat frequency response fitting an 8 dB response envelope when placed in the newly designed earcup which is lighter in weight but more rugged than the present standard SPH-4. The new ear-cushion utilizes a low permeability foam for improved attenuation in the low and mid-frequency range, which is covered with a urethane film for low temperature flexibility and body oil resistance. (Author)

AD-A049 041/7CP MF **A01**
Office of Telecommunications Boulder Colo
Precipitation Variability in the U. S. A. For Microwave Terrestrial System Design
E. J. Dutton. Nov 77, 132p Rept no. OT-77-134
Availability: Microfiche copies only.
Identifiers: PRED77 computer program, *Atmospheric attenuation.

A FORTRAN computer program, entitled PRED77, has been prepared to predict SHF microwave link degradation due to rain-caused attenuation in the United States of America. This program, which predicts 5, 50, and 95 percent confidence levels of rain-caused attenuation, is similar to one developed earlier for Europe. Major changes are in the prediction of rain rate climatology. A telecommunications-oriented rainfall climatological index is developed for the U.S.A., and 19 zones of similar rainfall characteristics are subsequently developed, using a 359-station data base. Contour maps of important input parameters that can be used to assess rain rate and its variance at a location via numerical methods in PRED77 are presented. These numerical methods are also discussed, as well as the limitations of these methods for large variances of the input parameters. As in earlier work for Europe, an interpolation scheme for obtaining otherwise unknown data at a location from the 359-station data base is included in PRED77.

AD-A049 211/6CP PC **A05**/MF **A01**
Office of Telecommunications Boulder Colo
Computer Software for EWCS Performance Prediction
Technical memo.
E. J. Dutton. Aug 76, 96p Rept no. OT-76-225

Descriptors: *Microwave communications, *Radiation attenuation, *Atmospheric scattering, Computer applications, Mathematical prediction, Microwave networks, Radio links, Performance, Confidence level, Variations, Programming manuals, Computer programs, Fortran, Flow charting, Rainfall, Europe.
Identifiers: PROGRAM PREDIC computer program, Fortran 4 programming language, Atmospheric attenuation.

A computer program in FORTRAN IV language entitled PROGRAM PREDIC has been prepared. This calculates performance prediction and its 5 and 95 percent confidence levels for microwave terrestrial links (8 to 30 GHz) operating in the European Wideband Communication System (EWCS). This program predicts atmospheric attenuation, principally due to rain, at the indicated frequencies. (Author)

AD-A049 288/4CP PC **A09**/MF **A01**
Carnegie-Mellon Univ Pittsburgh Pa Dept of Computer Science
Speech Understanding Systems. Summary of Results of the Five-Year Research Effort at Carnegie-Mellon University
Interim rept.
Aug 77, 182p AFOSR-TR-78-0002

Contract F44620-73-C-0074

Descriptors: *Speech recognition, *Speech analysis, Man computer interface, Algorithms, Computer applications, Words(Language), Comprehension, Classification, Hypotheses, Word recognition, Vocabulary, Information processing, Signal processing, Parallel processing, Data processing, Semantics, Computer programs, Artificial intelligence.
Identifiers: Harpy system, Hearsay 2 project, Phonology.

This report is an augmented version of a report originally issued in September 1976, during the demonstration at the end of the five-year speech effort. The first section reports on the various speech understanding systems developed at CMU during the five year period and highlights their individual contributions. After a brief description of several techniques and knowledge sources that contributed to the success of the final systems, detailed performance results of the Harpy and Hearsay-II systems are provided. Results include the performance of the systems not only for the 1000 word task but for several simpler tasks. Also included are reprints of papers presented at various conferences since September 1976 and a list of publications of the CMU speech group.

AD-A049 310/6CP PC **A12**/MF **A01**
Harris Corp Melbourne Fla Electronic Systems Div
Analysis of Jitter Characteristics in a Pulse Stuffing TDM Network
Final rept. Aug 76-Jun 77
J. A. Gracia, and Thomas G. Zogakis. Jun 77, 258p AD-E100-005
Contract DCA100-76-C-0072

Descriptors: *Communications networks, *Time division multiplexing, *Data transmission systems, *Synchronization(Electronics), *Pulses, Computerized simulation, Multiplexing, Test and evaluation, Phase detectors, AN/GSC-24, FORTRAN, Computer programs, Mathematical models, Breadboard models, Peak values.
Identifiers: Jitter, Pulse stuffing, Phase jitter, GASP 4 computer program.

The purpose of this study and breadboard development program was to provide an understanding of the performance of networks which utilize equipment employing pulse stuffing synchronization. The study was divided into two phases. Phase I covered (a) analytical investigations of jitter characteristics, (b) recommended jitter specification formulation and (c) development of a breadboard testbed. Phase II covered testbed evaluation and experimentation. The Phase I study approach consisted of developing three tools to study the jitter problem: (a) mathematical models,, (b) a software simulator and (c) a breadboard testbed. In Phase II RMS and peak-to-peak jitter data were collected and analyzed for various system design parameter inputs. The output data of the test and evaluation phase were compared with the analysis simulation results. Descriptions of the analysis tools, experiments, and results for both phases are included in this report. (Author)

AD-A049 520/0CP PC **A03**/MF **A01**
New Mexico Univ Albuquerque Dept of Electrical Engineering and Computer Science
Early Data from a Real-Time Cochlea
Final rept. Sep 76-Sep 77
Victor W. Bolie. Oct 77, 36p EE-249(77)AFOSR-479-1, AFOSR-TR-78-0011
Grant AFOSR-77-3110

Descriptors: *Cochlea, *Vocoders, *Speech recognition, Real time, Computer programs, Phonemes, Automatic.
Identifiers: Automatic speech recognition.

Development of the artificial cochlea was reported under previous grant. Work on this grant was oriented at testing the cochlea for automatic speech recognition. Use of the HP-9830 indicated that it is a good machine for low budget ASR if ways can be found to slow down input data rate. Data was taken on the 21 prolongable phonemes using the cochleas model. One surprise noted was a finding of high consistency in the first moment of the cochleas response to a given phoneme, irrespective of pitch. Much more analysis of data remains to be done; however, funding of this work has been discontinued due to other priorities. (Author)

AD-A049 549/9CP PC **A02**/MF **A01**
Army Communications-Electronics Engineering Installation Agency Fort Huachuca Ariz Propagation Engineering Div
Antenna Selection for Ionospheric Telecommunication Systems
Final technical memo.
George Lane. Jan 77, 8p Rept no. EMEO-PED-TM-77-1

Descriptors: *Antennas, *Ionospheric propagation, *Telecommunication, *Radio links, Nomographs, High frequency, Angle of arrival, Area coverage, Gain, Coupling(Interaction), Radiofrequency interference, Computer programs, Digital computers, Frequency response, Maintainability, Costs.
Identifiers: CDC-6500 computers.

This memorandum presents the general principles used in the design analysis of ionospheric telecommunication systems. In particular the requirements imposed by the propagating media are discussed. A technique for data presentation of predicted circuit performance is given in addition to several nomographs which are useful to the antenna selection process. (Author)

AD-A049 740/4CP PC **A04**/MF **A01**
Syracuse Univ N Y
Experimental Validation of the Antenna Pattern Distortion Computer Program (VHF Antenna)
Phase rept.
Jose Perini, and Hubert Moses. Dec 77, 58p RADC-TR-77-374
Contract F30602-75-C-0121
See also Rept. no. RADC-TR-77-35, AD-A038 142.

Descriptors: *Antenna radiation patterns, *Dipole antennas, *Antenna arrays, Computer programs, Electromagnetic compatibility, Very high frequency, Electromagnetic fields, Standing wave ratios, Distortion, Voltage, Coupling(Interaction), Mathematical models, Communication equipment, Ground(Electrical), Electromagnetic radiation, Diameters, Scale models, Antenna masts, Method of moments.
Identifiers: Mutual coupling, Ground plane.

The Antenna Pattern distortionn Computer Program was written at the request of AFCS to evaluate the distortion on the radiation pattern of communication antennas when mounted in close proximity to each other, such as in the communication towers of many AF installations. Although the numerical method used in this computer program (Method of Moments) has been shown to be very accurate in many applications, it was felt desirable to verify it with an experimental validation study. This was done at the RADC anechoic chamber. The first phase of the validation was for the VHF antenna AN1181. In view of the fact that the actual frequency range of this antenna (100-156 MHz) is below that of the RADC anechoic chamber, it was necessary to build a scale model of the antenna. This report presents a description of the measurement procedure, the results and a comparison with the corresponding Antenna Pattern Distortion Computer Program runs.

AD-A051 543/7CP PC **A03**/MF **A01**
Input Output Computer Services Inc Cambridge Mass
Single-Channel Voice-Response-System Program Documentation. Volume I. System Description
Final rept. Sep 75-Jan 76.
Dec 77, 39p TSC-FAA-77-24.1
Contract DOT-TSC-1107-1

Descriptors: *Vocoders, *Message processing, *Computer program documentation, Machine coding, Vocabulary, Response, Real time, Differential pulse code modulation, Adaptive communications, Multichannel communications, Flow charting, Computer programming.
Identifiers: PDP-11/20 computers, PDP-11 computers, Design.

This report documents the design and implementation of a Voice Response System (VRS) using Adaptive Differential Pulse Code Modulation (ADPCM) voice coding. Implemented on a Digital Equipment Corporation PDP-11/20,R this VRS system supports a single audio-output channel. Vocabulary size is limited to 900 words or phrases. Input to the system consists of text messages or sentences in ASCII format transmitted to the 11/20 through a 300-baud asynchronous interface. A preliminary design for a VRS for 10 channels is reported.

AD-A052 087/4CP PC **A04**/MF **A01**
Royal Aircraft Establishment Farnborough (England)
Using British Standard Interfaces to Create a Fast Link Between Two Computers
Technical rept.
G. Sharples, and G. F. Drury. Jul 77, 56p RAE-TR-77010, DRIC-BR-59871

Descriptors: *Computers, *Data links, *Interfaces, Digital systems, User needs, Computer files, Multiple access, Memory devices, Computer programs, Input output devices, Intercommunication systems, Simulators, Great Britain.
Identifiers: PDP-11/40 computers, GEORGE-4 operating system.

An ICL 1906S running under the GEORGE 4 operating system and a Digital Equipment PDP 11/40 have been linked using British Standard Interfaces. The PDP 11 user is given access to the 1906S basic peripherals and filestore via the multi-access facilities of GEORGE. He also has the capability of transmitting files between the filestores of the two machines. This Report describes the implementation of the inter-machine link giving specifications for the hardware and software involved. (Author)

AD-A052 161/7CP PC **A10**/MF **A01**
Arinc Research Corp Annapolis Md
Economic Analysis of Selected Test Measurement and Diagnostic Equipment from the U.S. Army Communications Command Preferred Items List. Volume 2. Technical Report
Final rept. on Phase 3
H. Rosenberg, and J. Witt. May 75, 210p Rept no. 1072-02-3-1403
Contract DAEA18-72-A-0005

Descriptors: *Military procurement, *Diagnostic equipment, *Test equipment, Army equipment, Economic analysis, Life cycle costs, Computer programs.

ARINC Research Corporation is conducting an economic analysis of Test Measurement and Diagnostic Equipment (TMDE) from the U.S. Army Communications Command (USACC) Preferred Items List (PIL). The analysis is being performed for the U.S. Army Electronics Command, Fort Monmouth, and USACC, Fort Huachuca. This study is being conducted in five phases, with the overall objective being to evaluate the potential economic benefits of adoption of the complete PIL. Details of Phase III, an economic analysis of selected TMDE, are described in this report. The report is divided into two volumes, the first volume being a management summary and the second (this document) providing detailed results. Phase I and II of the TMDE economic analysis were reported upon in previous publications of ARINC Research Corporation. (Author)

AD-A052 350/6CP PC **A02**/MF **A01**
Defence Research Establishment Pacific Victoria (British Columbia)
The Effect of an Interfering Signal on the Performance of Nonparametric Detectors Using Spectral Estimates
Technical memo.
M. J. Wilmut, and R. F. MacKinnon. Dec 77, 18p Rept no. DREP-TM-77-11

Descriptors: *Radiofrequency interference, *Information theory, *Nonparametric statistics, Signal to noise ratio, Estimates, Ranking, Computer programs, Narrowband, False alarms, Canada.

Nonparametric statistics have been previously applied to spectral data in order to detect narrow band signals. Here the authors show the degradation in performance due to the presence of an interfering signal. A modified decision scheme is proposed to overcome this problem. It is shown that with this new technique, the presence of even a strong interfering signal does not seriously affect the ability to detect signals. (Author)

AD-A052 365/4CP PC **A04**/MF **A01**
Rome Air Development Center Griffiss AFB N Y
Offered Traffic Calculations
Rept. for Jan-Aug 77
Arthur Farrell, and Daniel McAuliffe. Feb 78, 73p
Rept no. RADC-TR-77-409

Descriptors: *Telephone systems, *Communications traffic, Systems engineering, Telephone lines, Trunks(Communications), Fortran, Computer programs, Load control, Computations, Algorithms, Flow charting.
Identifiers: Fortran.

This report presents a numerical technique for deriving offered telephone traffic load knowing both the carried load and the number of trunks over which it was carried. A FORTRAN Program is presented in Appendix I which performs this calculation. A Family of Tables is included in Appendix II which provides a correlation between carried and offered load for cases where the number of trunks go from 2 to 20. (Author)

AD-A052 568/3CP PC **A04**/MF **A01**
Mitre Corp Bedford Mass
Building Blocks for C3 Systems
Technical rept.
J. A. Clapp, and M. Hazle. Mar 78, 71p MTR-3504, ESD-TR-77-360
Contract F19628-77-C-0001

Descriptors: *Command and control systems, *Communication and radio systems, Modular construction, Computer programs, Computer architecture, Data rate, Feasibility Studies, Information processing.
Identifiers: Design.

This report contains the results of a one-year study to assess the feasibility of constructing the information processing components of C3 systems from reusable building blocks. The objective is to reduce the time, cost, and risk of acquiring and modifying C3 computer systems. Three kinds of building blocks are identified: requirements, design, and software. A data flow architecture is proposed as a framework for partitioning a system into functional components with flexibility to adapt to changing requirements and different configurations. A preliminary plan is presented for further work to demonstrate the building block concept for C3 systems. (Author)

AD-A053 242/4CP PC **A09**/MF **A01**
Office of Telecommunications Boulder Colo Inst for Telecommunication Sciences
Applications Guide for Propagation and Interference Analysis Computer Programs (0.1 to 20 GHz)
M. E. Johnson, and G. D. Gierhart. Mar 78, 183p FAA-RD-77-60
Contract FA-68-WAI-145, DOT-FA74WAI-424

Descriptors: *Radio transmission, *Computerized simulation, Communication satellites, Air to air, Air to surface, Electromagnetic compatibility, Instrument landings, Tacan, Electromagnetic interference, Models, Computer programs, Microwave frequency.
Identifiers: VOR, Very high frequencies, Ultrahigh frequencies, Superhigh frequencies, Radio frequency interference.

This report covers ten computer programs useful in estimating the service coverage of radio systems operating in the frequency band from 0.1 to 20 GHz. These programs may be used to obtain a wide variety of computer-generated microfilm plots such as transmission loss versus path length and the desired- to-undesired signal ratio at a receiving location versus the distance separating the desired and undesired transmitting facilities. Emphasis is placed on the types of outputs available and the input parameter requirements. The propagation model used with these programs is applicable to air/ground, air/air, ground/satellite, and air/satellite paths. It can also be used for ground-to-ground paths that are line-of-sight or smooth earth. Detailed information on the propagation models and software involved is not provided. The normal use made of these programs involves a Dapartment of Commerce (DOC) response to a Federal Aviation Administration (FAA) ARD-60 request for computer output and reimbursement to the DOC by the FAA for the associated costs. (Author)

AD-A053 600/3CP PC **A05**/MF **A01**
Office of Telecommunications Boulder Colo
Operational and Cost Considerations in the Use of Optical Waveguides in a Local Information Transfer System
Final rept.
R. L. Gallawa, and W. J. Hartman. Nov 77, 81p
Rept no. OT-77-133

Descriptors: *Optical communications, *Optical waveguides, *Information transfer, Information exchange, Coaxial cables, Fiber optics transmission lines, Glass fibers, Economic analysis, Cost models, Optical filters, Communication terminals, Computer programs, Mathematical models.
Identifiers: Information transfer systems.

Attention is given to the potential use of optical waveguides in an information exchange system consisting of many terminals distributed uniformly over a circle of radius R. Cost comparison is given between coaxial cable and glass fiber systems, based on a model described in Section 2. The results show that the wide bandwidth capability of fibers leads to definite cost advantages as data rates increase. The model concentrates on the star and the loop distribution systems. The report also discusses various ways of coupling energy into and out of the fibers.

AD-A053 684/7CP PC **A07**/MF **A01**
Pattern Analysis and Recognition Corp Rome N Y
Interactive Digital Receiver Simulator (IDRS) System User's Manual and Software Documentation
Robert E. bozek, Joseph C. Breda, Om P. Gupta, Roland H. Holman, and Raymond J. Staron. Mar 78, 148p PAR-76-30, RADC-TR-78-44
Contract F30602-76-C-0126

Descriptors: *Signal processing, *Receivers, *Computer programs, *Simulators, Digital systems, Spectrum analysis, Histograms.
Identifiers: IDRS computer program.

This report describes the design and implementation of the Interactive Digital Receiver Simulator (IDRS). The IDRS is a computer program that is capable of processing predetected signals that have been converted to digital format and recorded. It allows a user to computer interactively produce (1) desired hardcopy patterns of signals for a detailed analysis of modulation characteristics and (2) processed signal segments for processing by pattern analysis/recognition programs for feature extraction. In essence, the IDRS program provides the user with the capability of interactively creating a digital receiver to his specifications. (Author)

AD-A053 685/4CP PC **A16**/MF **A01**
Cnr Inc Needham Ma
DEMOD/Decoder Integration
Final technical rept. Jul 76-Sep 77
D. Chase, L. J. Weng, P. A. Bello, A. Joffe, and R. Pinto. Apr 78, 359p RADC-TR-78-70
Contract F30602-76-C-0361

Descriptors: *Radio links, *Pulse communications, *Tropospheric scatter communications, Line of sight, Digital systems, Demodulators, Decoders, Error correction codes, Data rate, Density, Modems, Computer programs, Iterations, Algorithms.
Identifiers: Maximum likelihood estimation.

This report considers the benefits to be gained by an integrated coding and modulation approach for high speed digital communications over line-of-sight (LOS) and troposcatter links. While the importance of coding on tropo links has been previously established, this work indicates that error correction coding also plays an important role in the design of high bit packing density LOS modems. This result was not known apriori and, in fact, conventional rate-1/2 codes were shown to be ineffective for LOS modems operating with packing densities in excess of 2 bits/sec/Hz. However, an efficient 2 bits/sec/Hz and a 4 bits/sec/Hz modem, utilizing a rate-8/9 block code, were shown to yield superior performance to uncoded modems at this same packing density.

AD-A054 604/4CP PC **A05**/MF **A01**
IIT Research Inst Annapolis Md
FAA Remote Terminal System
Final rept.
Thomas Hensler. Nov 77, 98p ECAC-PR-77-067
Contract F19628-78-C-0006, DOT-FA76WAI-612

Descriptors: *Frequency allocation, *Remote terminals, *Air traffic control systems, Electromagnetic compatibility, Computer programs.
Identifiers: Interdepartment radio advisory committee, GMF(Government Master File), ACES(Adaption Controlled Environment System).

A system of interactive analysis program was developed by the Electromagnetic Compatibility Analysis Center (ECAC) for the Federal Aviation Administration (FAA). This system provides automated, quick-response capabilities for use by the FAA frequency managers to solve daily frequency management problems. The system can be used to display records from the FAA Air Traffic Control (ATC) data base, provide electromagnetic compatibility (EMC) analyses, make frequency assignments, and plot service volumes. The typical program inputs and sample results are shown in the appendixes. (Author)

AD-A054 726/5CP PC **A06**/MF **A01**
Systems Exploration Inc San Diego Ca
HF Channel Simulator for Wideband Signals. A Mathematical Model and Computer Program for 100-kHz Bandwidth HF Channels
Final rept. Feb-Oct 77
R. Lugannani, H. C. Booker, and L. E. Hoff. 31 Mar 78, 103p NOSC-TR-208
Contract N00123-76-C-1090

Descriptors: *Simulators, *Mathematical models, *Multichannel communications, FORTRAN, Broadband, High frequency, Ionosphere, Computer programs.

A simulator has been developed that is capable of modeling the wideband HF channel. It is designed for carrier frequencies in the 2-32 MHz range and it can accommodate bandwidths up to 100 kHz and ground ranges up to 1000 km. It models the groundwave and ionosphere returns, but does not include additive noise or signal distortion produced in the transmitter or receiver. The inputs are the basic physical quantities that characterize the ionosphere (height, thickness, and maximum electron density of the E and F regions, sunspot number, time of day, etc) and those quantities that characterize the transmitter-receiver environment (carrier frequency, range, geographic location, antenna patterns, etc). Explicit values for channel parameters such as delay, attenuation, and doppler shift and spread are not required as these are calculated internally. The simulator is divided into two parts. The first part is concerned with the mathematical model of the ionosphere and the computation of the channel parameters from the basic inputs. These channel parameters are used in the second part to determine the response for arbitrary inputs. A software version of the simulator has been implemented and tested, and a Fortran listing of the program is appended. The program runs in non-real time and requires a computer with a Fortran IV compiler and at least 28 K of core. (Author)

AD-A054 750/5CP PC **A02**/MF **A01**
Arinc Research Corp Santa Ana Calif

A Computerized Command and Control System for the Los Angeles City Fire Department
D. J. Nielsen, and H. G. Ryland. Dec 67, 25p
Rept no. 4826-851
Prepared in cooperation with the Los Angeles City Fire Dept.

Descriptors: *Fire fighting, *Command and control systems, *Computer communications, Computer applications, Systems engineering, Fire alarm systems, Fire safety, Systems management, Display systems, Control centers, Data processing, Computer programs, Radio links, Backup systems, Human factors engineering.
Identifiers: Los Angeles(California), California.

This paper describes a fire department C and C system which is more advanced than any existing system. However, nothing in the system is new or 'way out'. In fact, identical equipments performing similar functions have been in operation for a number of years. The application of this technology to the fire service is the part of this project that is new. The success of this project is largely due to the fact that it was a coordinated team effort involving the Los Angeles City Fire Department, the Department of Public Utilities and Transportation, and ARINC Research Corporation. Each element of this team provided unique knowledge and experience which was combined to effectively develop an optimum fire department Command and Control System for the City of Los Angeles. This C and C System is extensive since it was designed for one of the largest cities in the world; however, a similar system with most of the capabilities that have been described can be provided to meet the needs and budgets of fire departments of any size. (Author)

AD-A054 878/4CP PC **A04**/MF **A01**
Esl Inc Sunnyvale Calif
Description of the MILSATCOM Loading Program 'OPAL'
Rept. no. 1 (Final)
Paul D. Shaft. Oct 77, 59p ESL-TM888, AD-E100-057
Contract DCA100-77-C-0015

Descriptors: *Communication satellites, *Military satellites, *Loading(Electronics), *Computer programs, Communications traffic, Communication satellite terminals, User needs, Allocations, Power levels, Data links, Bandwidth, Military Requirements.
Identifiers: *OPAL computer program, MILSATCOM(Military Satellite Communications), Military Satellite Communications, SCALE computer program, Satellite loading.

This report describes a computer program that performs loading calculations on military communication satellites. The program interfaces with the JCS approved user requirements data base (URDB) to assess the ability of different satellites to meet stated requirements. Different satellites, priorities, scenarios and time frames may be specified by the user. The program calculates the satellite resources needed to satisfy the requirements. (Author)

AD-A054 879/2CP PC **A03**/MF **A01**
Esl Inc Sunnyvale Calif
Users Guide for the MILSATCOM Loading Program 'OPAL'
Rept. no. 2
G. D. Heinz. Oct 77, 49p ESL-TM887, AD-E100-059
Contract DCA100-77-C-0015

Descriptors: *Communication satellites, *Military satellites, *Loading(Electronics), *Computer programs, Programming manuals, Communications traffic, Communication satellite terminals, User needs, Allocations, Power levels, Data links, Bandwidth, Military requirements.
Identifiers: *OPAL computer program, Scale computer program, MILSATCOM(Military Satellite Communications), Military Satellite Communications, Satellite loading.

This report describes the use of a computer program that interfaces with the JCS-approved User Requirements Data Base (URDB) to assess the ability of different satellites to meet stated requirements. Input to the program consists of specifications of various program options controlling satellite modeling, the loading algorithm and 'sieves' on the URDB. Output consists of loading results summarized according to several criteria. The program is run in batch on the IBM/370 at Reston, VA, or the IBM/360 at Arlington. Interactive run setup is available at the Reston facility. (Author)

AD-A054 880/0CP PC **A02**/MF **A01**
Esl Inc Sunnyvale Calif
Description of the MILSATCOM Loading Program 'OPAL': GPSCS Addendum
Rept. no. 3 (Final)
Paul D. Shaft. Mar 78, 20p ESL-TM939, AD-E100-058
Contract DCA100-77-C-0015

Descriptors: *Communication satellites, *Military satellites, *Loading(Electronics), *Computer programs, Modification, communications traffic, Communication satellite terminals, User needs, Allocations, Power levels, Data links, Bandwidth, Military requirements.
Identifiers: *OPAL computer program, SCALE computer program, MILSATCOM(Military Satellite Communications), Military Satellite Communications, Satellite loading.

This report describes modifications that have been made to the OPAL computer program in order to perform loading calculations for GPSCS satellites. The modifications include masking routines to made temporary changes to the URDB and a procedure that allows the program user to generate different satellite configurations. (Author)

AD-A054 881/8CP PC **A04**/MF **A01**
Esl Inc Sunnyvale Calif
Users Guide for the MILSATCOM Loading Program 'OPAL': GPSCS Addendum
Rept. no. 4 (Final)
G. D. Heinz. Mar 78, 61p ESL-TM938, AD-E100-060
Contract DCA100-77-C-0015

Descriptors: *Communication satellites, *Military satellites, *Loading(Electronics), *Computer programs, Modification, Programming manuals, Communications traffic, Communication satellite terminals, User needs, Allocations, Power levels, Data links, Bandwidth, Military requirements.
Identifiers: *OPAL computer program, SCALE computer program, MILSATCOM(Military Satellite Communications), Military Satellite Communications, Satellite loading.

This report describes the use of a modified computer program that interfaces with the JCS-approved User Requirements Data Base (URDB) to assess the ability of different satellites to meet stated requirements. Input to the program consists of specifications of various program options controlling the loading algorithm and 'sieves' on the URDB. Dynamic modifications to selected entries of the URDB may be specified. (Author)

AD-A055 167/1CP PC **A02**/MF **A01**
Arinc Research Corp Annapolis Md
Application of Tactical Data System Computer-Programming Specification to TAOC
C. McIndoe, C. Kimme, D. Mileson, and T. Worley. Sep 67, 23p Rept no. 555-01-4-812
Contract N00024-67-C-1413

Descriptors: *Tactical data systems, *Computer program documentation, Flow charting, Diagrams, Computer programs, Subroutines, Computer logic, Target acquisition, Height finding, Reliability, Maintainability, Combat information centers, Tactical air control systems.
Identifiers: Tactical Air Operations Center.

A computer-program documentation procedure to replace conventional flow diagrams for tactical data systems is summarized. Two types of graphic documentation are described: Program Flow Diagrams and Functional Flow Charts. (Author)

AD-A055 192/9CP PC **A06**/MF **A01**
Air Force Inst of Tech Wright-Patterson AFB Ohio School of Engineering
Structured Analysis and Design of a Satellite Simulator
Master's thesis
Kenneth L. Marvin. Sep 77, 109p Rept no. AFIT/GE/EE/77S-6

Descriptors: *Command and control systems, *Artificial satellites, *Computerized simulation, Computer programs, Systems analysis, Requirements, Specifications, Downlink, Data links, Message processing, Error analysis, Theses.

The problem addressed in this thesis is the analysis of a complex satellite command system and the design of a software simulation of that system. The problem is solved in three steps. First, a written requirements definition establishes a sound viewpoint and purpose on which the analyst can base his design. This requirements definition explains why the simulator is to be created, how it is to be constructed, and what it is to do. Second, a top-down strategy called 'structured analysis' is applied to create the preliminary design. The structured analysis is presented in a blueprint-type language with activity and data models. The models represent graphically the functions performed by the simulator and the information upon which those functions act. A final design refinement is performed with a structured design methodology called 'transform analysis.' The structure charts drawn during the transform analysis reveal system characteristics which illustrate design quality. The activity model acts as a catalyst to a successful transition from a top-down analysis to a structured design which can be evaluated. The resulting simulator design, with minor revisions, satisfies the design resulting goals established for the project. The methodology used is highly recommended for the analysis and design of any software system. (Author)

AD-A055 236/4CP MF **A01**
Air Force Inst of Tech Wright-Patterson AFB Ohio School of Engineering
An Algorithm for Determining Speech Intelligibility
Master's thesis
Wayne R. Beeson. Dec 77, 63p Rept no. AFIT/GE/EE/77-9
Availability: Document partially illegible.

Descriptors: *Speech recognition, *Intelligibility, Speech articulation, Masking, Background noise, Signal to noise ratio, Digital systems, Signal processing, Fast fourier transforms, Cross correlation, Algorithms, Flow charting, Computer programs, Theses.

A method of predicting speech intelligibility using computer algorithms is presented. Diagnostic Rhyme test number four was used to measure speech intelligibility using a subjective listener test and these results were used as a basis for comparison with the intelligibility predictions made by the computer algorithm. An audio recording of a speaker reading the Diagnostic Rhyme test was made. This recording was run through a General Electric radio system and varying amounts of noise were added. The output of the radio system was recorded, providing a copy of the input word corrupted by both additive noise and radio system distortion effects. Both the input recording and the noisy output recording were digitized by sampling the analog waveforms at a 10 kilohertz rate. These digital samples were converted to a frequency format by windowing the time samples with a rectangular window 128 time samples in length and processing them using Fast Fourier transform techniques.

AD-A055 364/4CP MF **A01**
Philco-Ford Corp Willow Grove Pa
Phonemic Category Experiments
Final technical rept. Jan 69-Jan 70
Louis R. Focht. Jan 70, 82p RADC-TR-70-84
Contract F30602-69-C-0169
Availability: Microfiche copies only.

Descriptors: *Word recognition, *Phonemes, *Speech analysis, Computer programs, Algo-

rithms, Acoustic filters, Signal processing, Speech articulation, FORTRAN, Vocabulary, Man computer interface, Accuracy.
Identifiers: Nearest neighbor rules, Formants.

This report describes the efforts undertaken to improve the experimental model 'Voice Sound Recognizer' originally built under Contract AF 30602-67-C-0300. This equipment utilized the techniques of Single Equivalent Formant parameter extraction, phonemic category recognition, and category-sequence word recognition. Extensive hardware and software modifications to the basic recognizer system were made during the program which include the use of semiautomatic speaker adaptation by means of distance functions defined by sets of phonemic category strings and nearest neighbor word recognition decisions. The final recognizer configuration displayed a reduced speaker sensitivity and an average recognition rate for four speakers of 85% when using a 25-word vocabulary. (Author)

AD-A055 438/6CP PC **A04**/MF **A01**
Bolt Beranek and Newman Inc Cambridge Mass
Combined Quarterly Technical Report No. 9. Volume 1. Packet Broadcast by Satellite PLURIBUS Satellite IMP Development UNIX System Development
May 78, 71p Rept no. BBN-3824-VOL-1
Contract MDA903-76-C-0214, MDA903-76-C-0252

Descriptors: *Communication satellites, *Satellite networks, Message processing, Algorithms, Computer programs, Monitoring, Control.
Identifiers: *PLURIBUS satellite, Packet communications, Radio broadcasting.

This Quarterly Technical Report describes work on the development of and experimentation with packet broadcast by satellite, on development of a Transmission Control Program for UNIX and of PLURIBUS Satellite IMPs. (Author)

AD-A055 439/4CP PC **A03**/MF **A01**
Bolt Beranek and Newman Inc Cambridge Mass
Combined Quarterly Technical Report Number 9. Volume 2. Private Line Interface Development Packet Network Security
May 78, 40p Rept no. BBN-3824-VOL-2
Contract MDA903-76-C-0214, MDA903-76-C-0252

Descriptors: *Communication satellites, *Satellite networks, Message processing, Computer programs, Maintenance, Algorithms, Electronic security, Secure communications.
Identifiers: PLURIBUS satellite, Telecommunication, Packet communications, Radio relay systems, Interfaces.

This Quarterly Technical Report describes work on the development of a Private Line Interface and end-to-end packet network security.

AD-A055 574/8CP PC **A07**/MF **A01**
System Development Corp Santa Monica Calif
Software Acquisition Management Guidebook: Cost Estimation and Measurement
Technical rept.
Marsha Finfer, and Russell Mish. Mar 78, 142p SDC-TM-5772/007/02, ESD-TR-78-140
Contract F19628-76-C-0236

Descriptors: *Command and control systems, *Communication and radio systems, *Computer programs, Handbooks, Air Force operations, Specifications, Military requirements, Systems management, Air Force procurement, Life cycle costs, Quality assurance, On line systems, Configuration management, User needs, Real time, Closed loop systems, Display systems.

The Software Cost Estimation and Measurement guidebook is designed to assist Air Force personnel who are responsible for estimating and controlling the costs of embedded software within command, control, and communications systems. It provides a basic understanding of the current methodologies used in the formation of Air Force and contractor software cost estimates. Insight is provided into some of the problems (and reasons for the problems) associated with software cost estimates made by both Government and industry. The guidebook discusses the role of parametric models used in cost estimation and reviews three experimental predictive models. It also discusses the process of monitoring software costs and schedules while providing guidance to relevant military regulations, specifications, standards, and supporting literature. Much of the information and guidance provided is applicable to smaller less complex systems, but in all cases, it should be tailored to the needs of individual projects. (Author)

AD-A055 575/5CP PC **A04**/MF **A01**
System Development Corp Santa Monica Calif
Software Acquisition Management Guidebook: Series Overview
Technical rept.
Russell K. Mish. Mar 78, 55p SDC-TM-5772/009/01, ESD-TR-78-141
Contract F19628-76-C-0236

Descriptors: *Command and control systems, *Communication and radio systems, *Computer programs, Handbooks, Air Force operations, Specifications, Military requirements, Systems management, Air Force procurement, Life cycle costs, Quality assurance, On line systems, Configuration management, User needs, Real time, Closed loop systems, Display systems.

The Overview Guidebook is one of a series of Software Acquisition Management (SAM) guidebooks intended to help ESD Program Office personnel in the acquisition of embedded software for command, control and communications systems. The Overview guidebook serves as the introductory volume. It (1) describes the series, placing it in the overall context of the Air Force Guidebook program; (2) defines the intended audience of the series; (3) tells how the guidebooks were developed; (4) makes recommendations concerning guidebook usage; (5) summarizes the contents of each guidebook; (6) provides a subject matter index for the series; (7) identifies future guidebook requirements; and (8) provides complete bibliographical citations for each guidebook. (Author)

AD-A055 605/0CP PC **A05**/MF **A01**
Institute for Telecommunication Sciences Boulder Colo
Propagation Model (0.1 to 20 GHz) Extensions for 1977 Computer Programs
G. D. Gierhart, and M. E. Johnson. May 78, 91p FAA/RD-77/129
Contract DOT-FA-74-WAI-424, FA-68-WAI-145

Descriptors: *Electromagnetic wave propagation, *Computer programs, *Radio reception. Frequency allocation, Radiofrequency interference, Air to air, Superhigh frequency, Very high frequency, Radiofrequency power, Instrument landings, TACAN, Transmission loss, Scintillation, Rain, Aircraft antennas.
Identifiers: Computerized simulation.

This report describes methods used in the 1977 extensions of the propagation model incorporated into computer programs for propagation and interference analysis (0.1 to 20 GHz). These extensions to the 1973 Model allow the programs to be used for a wider variety of problems such as those involving air/air or air/satellite propagation. Method descriptions are confined to mathematical formulations for modifications to the 1973 Model, and do not include program listings or flow charts. A detailed description of the 1973 Model, including program listings, is provided in DOT Report FAA-RD-73-103. Capabilities of the 1977 computer programs are mentioned, but not discussed in detail. These capabilities are covered in DOT Report FAA-RD-77-60 which is an APPLICATIONS GUIDE for the programs. (Author)

AD-A055 945/0CP MF **A01**
Army Military Personnel Center Alexandria Va
X-SIM. A Dynamic Communications Simulator for the X-Tree Network Report and User's Manual
Final rept.
Paul Arthur Suhler. 15 Jun 78, 90p
Master's thesis.
Availability: Microfiche copies only.

Descriptors: *Multiprocessors, *Communications networks, *Computerized simulation, Simulators, Trees, Channels, User needs, Manuals, Input output processing, Byte functional modules, Data transmission systems, Statistical analysis, Sampling, Switching circuits, Computer programs.
Identifiers: Virtual memory, *Computer performance evaluation.

This report introduces the virtual channel concept of interprocessor communications and describes the information needed to evaluate its performance in X-Tree. The requirements for a dynamic communications simulation are derived and an implementation is presented which simulates to the level of byte transmission and produces a trace output. An example statistics program is given which inputs the trace and outputs a statistical summary of selected performance indices for the network. A user's guide for the simulator is included as are sample simulation outputs. (Author)

AD-A056 102/7CP PC **A07**/MF **A01**
Mitre Corp Bedford Mass
AFSATCOM Life Cycle Cost Model
J. H. James, and W. M. Stein. Jun 78, 150p MTR-3057, ESD-TR-78-114
Contract F19628-77-C-0001

Descriptors: *Life cycle costs, *Cost models, *Communication satellites, *Logistics, Air Force, Mathematical models, Maintenance, Repair.
Identifiers: Computerized simulation, Fortran, SITELCC computer program.

A Life Cycle Cost (LCC) mathematical model has been developed for the Air Force Satellite Communications System (AFSATCOM). The model (under FORTRAN program name SITELCC) has been used in various tradeoff analyses involving acquisition costs, operation and support costs, and system performance. The AFSATCOM LCC Model provides for three echelons of maintenance, for communications terminal configurations of black boxes which may differ from base to base, and for reliability data which is a function of operating environment. In addition to LCC, the model calculates terminal availability as a result of initial sparing levels computed. This report presents the detailed structure of the model. A description of the output reports with illustration from a sample model run is included. (Author)

AD-A056 173/8CP MF **A01**
ITT Defense Communications Div Nutley N J
Phased Array Antenna Amplifier Exploratory Development Model (100 watts)
Semi-annual rept. no. 1, Jun-Dec 77
P. Muscianesi, J. Irvine, J. Ranghelli, and A. Gruber. Feb 78, 74p ECOM-77-0146-1
Contract DAAB07-77-C-0146
Availability: Microfiche copies only.

Descriptors: *Phased arrays, *Antenna arrays, *Tropospheric scatter communications, *Microwave amplifiers, Solid state electronics, Scale models, Radio transmitters, Parabolic antennas, C band, Radio receivers, Scanners, Computer programs.
Identifiers: Power combining, AN/GRC-143, Mechanical scanners.

The Phased Array Antenna Amplifier Exploratory Development Program will provide analysis, design and construction techniques to fabricate a scale model for a mechanically steerable phased array antenna amplifier for troposcatter communication system applications. The ultimate goal of this analysis is to determine the technical capabilities, limitations, constraints and cost feasibility for a lkw system. Implementation of this program requires analysis in two major technical areas: Matstup (Printed) antenna and solid state high power generation and combining. During this reporting period - June 1977 to December 1977 - low loss combining techniques coupled with efficient amplifier design attained 8.9 watts at 4.7 Ghz with a 1 db bandwidth covering 4.4 Ghz to 5.0 Ghz. Computer programs were generated and validated to aid in the design of the antenna dipole excitation pattern required to achieve the 30 dbi gain and 15 db sidelobes. These programs also provided the capability to analyze antenna performance degradation vs. amplitude and phase errors introduced as a result of fabrication and RF excitation. During the next reporting period, a 38 inch by 38 inch antenna array employing an amplitude taper will be fabricated and tested. Assembly and test of the basic power modules will be in progress and the IPA amplifier chain will be complete. (Author)

AD-A056 231/4CP PC **A05**/MF **A01**
Logicon Inc San Diego Calif
LISTEN: A System for Recognizing Connected Speech Over Small, Fixed Vocabularies, In Real Time
Final rept. Jul 77-Mar 78
J. E. Porter. Apr 78, 98p NAVTRAEQUIPC-77-C-0096-1
Contract N61339-77-C-0096

Descriptors: *Speech recognition, Speech, Preprocessing, Algorithms, Real time, Accuracy, Decoding, Minicomputers, Computer programs, FORTRAN, Vocabulary, Limitations, Word recognition, Classification, Sequences, Dynamic programming, Training devices, Error analysis.
Identifiers: LISTEN computer program.

This report describes the development of a system for recognizing connected speech in real time using a commercially available speech preprocessor, a minicomputer and programs written in FORTRAN. The system was tested on two speakers using the digits and the word 'point' with inconclusive results. Recognition accuracy of 86% was achieved for one speaker whereas accuracy for the other speaker was lower (39%) due to an anomalous difference between training and test data for that speaker's voice. (Author)

AD-A056 509/3CP PC **A08**/MF **A01**
Air Force Inst of Tech Wright-Patterson AFB Ohio School of Engineering
Automatic Recognition of Synthetic Speech Using an Electronic Model of the Middle and Inner Ear
Doctoral thesis
Donald B. Warmuth. 5 Jun 78, 168p Rept no. AFIT/DS/EE/78-3

Descriptors: *Speech recognition, Computer applications, Automation, Models, Ear, Speech analysis, Phonemes, Parts, Synthesis, Algorithms, Computer programs, Theses.

A phoneme-based automatic speech recognition system was developed and tested using synthetic speech. The acoustic signal is divided into short segments for analysis; segments are either a single pitch period of voiced speech or a 10 ms sample of voiceless speech. These segments are independently analyzed and given a phonemic name by three different measures. The sub-phonemic segments are grouped using measures which reflect dynamic changes in the speech signal. Each group of segments represents a phoneme and is identified by simple algorithms operating on the string of phonemically-named segments that form the group. The phoneme-based recognition system was tested using isolated synthesized words which permitted evaluation with connected strings of phonemes but stopped short of requiring development of word boundary rules. The tests consisted of 100 phonemically balanced words containing 281 phonemes. Of these, 245 were correctly identified, 23 were mis-identified, 13 were missed entirely, and 11 were added. However, many of these errors were predictable or understandable and may be overcome at a higher (word or phrase) level. (Author)

AD-A056 579/6CP PC **A02**/MF **A01**
Xerox Corp Palo Alto Calif
Research on Interlisp and Network-Based Systems
Final rept. 1 Jul 77-31 Mar 78
W. Teitelman. 24 May 78, 4p
Contract N00014-77-C-0277, ARPA Order-2906

Descriptors: *Computer communications, Programming languages, Debugging(Computers), Computer program documentation, Programming manuals, Computer files, Subroutines.
Identifiers: *Interlisp system, ARPA computer network.

This report covers a variety of activities and services centering around the continued growth and well-being of Interlisp, a large interactive system widely used in the ARPA Community for developing advanced and sophisticated computer-based systems.

AD-A056 901/2CP PC **A03**/MF **A01**
Mitre Corp Bedford Mass
Multics Security Kernel Validation: Proof Description. Volume I
S. R. Ames , and D. K. Kallman. Jul 78, 38p MTR-3384-VOL-1, ESD-TR-78-148-VOL-1
Contract F19628-77-C-0001

Descriptors: *Data processing security, *Secure communications, *Computer communications, Computer program verification, Mathematical models, Kernel functions, Systems analysis, Systems engineering, Specifications, Multiple access, Multiple operation, Error analysis.
Identifiers: Multics system.

A major step in the design of a system intended to support multilevel operation is the demonstration that the design is secure. One methodology for demonstrating security is to define (model) a security policy and mathematically verify that the design adheres to that policy. The first step in the design process, after the model, is a rigorous but abstract specification of the system. This paper was written to demonstrate the security of the top level specification for Multics security kernel. Security is demonstrated by a rigorous proof that the abstract specifications correspond to the model. (Author)

AD-A056 960/8CP PC **A04**/MF **A01**
Electronics Engineering Group (1842nd) Scott AFB Ill
Data Network Referee (DNR) Concept Report
Technical rept.
John F. Hynes. 26 May 78, 65p Rept no. 1842 EEG/EETS-TR-78-2

Descriptors: *Computer communications, *Communications networks, *Data links, Data transmission systems, Failure(Electronics), Reliability(Electronics), Monitoring, Malfunctions, Faults, Error detection codes, Computer programs, Computer architecture, Data processing terminals, Minicomputers.

A concept is presented for monitoring, detecting, and identifying faults and subsystem failures, on the functional level, in Data Communications Networks. A brief review is included of the operating conditions of some existing data comm systems. (Author)

AD-A056 964/0CP PC **A04**/MF **A01**
Aeronautical Systems Div Wright-Patterson AFB Ohio
B-1 EMUX Automated Logic Diagrammer Demonstration Program
Final rept. Jul 75-Sep 77
Ronald B. Berger. May 78, 53p Rept no. ASD-TR-78-17

Descriptors: *Jet bombers, *Electrical loads, *Computer logic, *Multiplexing, Computer programs, Compilers, Logic circuits, Subroutines, Computer files, FORTRAN, Boolean algebra, Diagrams.
Identifiers: *B-1 aircraft, EMUX(Electrical Multiplex System), Electrical Multiplex System, Bold computer program, Automatic control.

The B-1 aircraft Electrical Multiplex System (EMUX) is a programmable computer network which provides control of aircraft electrical loads, provides automatic electrical load management, and provides digital data transfer. Boolean (or logic) equations are used to program the system. A computer program was developed in-house to demonstrate the feasibility of automatically creating logic diagrams of the boolean equations directly from the same EMUX computer files used to program the system. Program BOLD (B-1 (One) Logic Diagrammer), the result of this study, is documented in this report. (Author)

AD-A056 981/4CP MF **A01**
Joint Tactical Communications Office Fort Monmouth N J
Cost Effectiveness Program Plan for Joint Tactical Communications. Volume III. Life Cycle Costing. Appendix F. Computer Models for LCC
Jun 78, 125p Rept no. TTO-ORT-032-78B-V3-AP-F
Supersedes report dated May 76, AD-A027 643. Appendix F to report dated Apr 78, AD-A055 147. Availability: Microfiche copies only.

Descriptors: *Tactical communications, *Cost effectiveness, *Life cycle costs, *Computerized simulation, Computer programs, Communication equipment, Joint military activities, Management planning and control, Logistics support, Military requirements, Maintenance personnel, Digital computers, Estimates, FORTRAN.
Identifiers: HP-9821A computers.

This appendix has been revised to update and correct some of the factors and cost estimating relationships (CER's) contained in the 1976 issue. This revision describes and documents computer models for CER's and presents sample life cycle cost calculations using the models. It also includes a revised FORTRAN IV Program User's Guide incorporating military personnel and training costs as part of it's costing methodology. The TRI-TAC Life Cycle Cost Element Structures from Volume III is used for formatting output costs. New features have also been added which will assist in formatting the estimates in a manner suitable for CAIG/DSARC presentations. (Author)

AD-A057 459/0CP PC **A10**/MF **A01**
Johns Hopkins Univ Laurel Md Applied Physics Lab
URLIM - A Unified Radome Limitations Computer Program. Volume 2. User's Guide
Technical memo.
R. K. Frazer. Apr 78, 218 Rept no. APL/JHU/TG-1293B
Contract N00017-72-C-4401

Descriptors: *Radomes, *Computer aided design, *Computer programs, Performance(Engineering), Flight testing, User needs, Aerodynamic heating, Aerodynamic loading, Thermal stresses, Radar, Boresighting, Guided missile components.
Identifiers: URLIM computer program.

URLIM, a unified radome limitations computer program has been developed to aid the radome design engineer by providing a definition of the maximum flight performance capabilities of radome materials. URLIM numerically determines the response of the radome to aerodynamic heating and loading. It computes the following as functions of trajectory time: thermal stress; radar boresight error slopes; missile-radome attachment stresses caused by maneuvers, pressure, and drag forces; and the onset of melting. The basic output of the program is a notation of trajectory time at which the radome reaches its design limitations. Many options are available to the user of the URLIM program that provide a wide variety of analysis capability. For this reason URLIM may also be considered as a general purpose aerodynamic heat transfer program as well as a specific purpose radome limitations program. Volume 1 of this report presents the theoretical background of the analysis techniques used in URLIM; Volume 2 provides a detailed explanation of how to use URLIM. (Author)

AD-A058 867/3CP PC **A12**/MF **A01**
Gte Sylvania Inc Needham Heights Mass
NUCOM/BREM. An Improved HF Propagation Code for Ambient and Nuclear Stressed Ionospheric Environments
Final rept. 19 Apr-30 Sep 76
G. P. Nelson. 1 Oct 76, 260p AD-E300-141
Contract DNA001-76-C-0261

Descriptors: *Ionospheric propagation, *Ionospheric disturbances, High frequency, Radio links, Coding, Nuclear explosions, Explosion effects, Antenna radiation patterns, Airborne, Polarization, Radio waves.
Identifiers: NUCOM computer program, BREM computer program.

The NUCOM/BREM computer code extends the NUCOM II HF propagation code to include direct ray and groundwave propagation modes for airborne and ground-based communications links. Provision is made for user-supplied airborne antenna patterns for both vertical and horizontal polarizations, and for corrected horizontal noise-factors for airborne terminals. A variety of airborne antenna patterns are included and sample links are evaluated. This computer code greatly extends the usefulness of NUCOM II for the analysis of HF links employing airborne terminals and relay aircraft. (Author)

AD-B004 707/6CP PC **A06**/MF **A01**
Threshold Technology Inc Cinnaminson N J
Phonemic Category Experiments
Final technical rept.
Phillips B. Scott. May 75, 105p RADC-TR-75-129
Contract F30602-73-C-0158
Distribution limitation now removed.

Descriptors: *Identification systems, Personnel, *Speech recognition, Identification, *Phonemes, Occurrence, pattern recognition, Probability distribution functions, Classification, Experimental data, Digital computers, Computer programs, Algorithms, Telephone lines, Band pass filters, Simulation, Signal processing, German language, Russian language, Chinese language, Ultralow frequency.
Identifiers: Speaker identification system, Voice information processor, Personnel identification, Weighting, Talkers.

This report describes improvements in both the software and hardware associated with the speaker identification subsystem (SID) of the RADC voice information processor (VIP) equipment, as well as the results of an extensive testing program to determine operation of the improved speaker identification subsystem under a variety of conditions. An extensive series of tests was conducted to determine the performance of the improved speaker identification system under a variety of conditions. For all of these tests, the speech data was band limited to a 300 Hz to 3 KHZ bandwidth, either by a filter or by a simulated telephone line. These test conditions included the use of training and test data samples from the same recording session for 20, 30 and 50 talkers, and data from different recording sessions for 20 and 50 talkers. Tests were conducted with a data base of 20 talkers with speech data degraded by a simulated communication line without external noise applied, with an 18 dB signal-to-noise ratio, and with a 12 dB signal-to-noise ratio. Tests also were conducted with 20 talkers in each of three foreign languages with a data base supplied by RADC to TTI. (Author)

AD-B006 851/0CP PC **A04**/MF **A01**
Threshold Technology Inc Cinnaminson N J
Voice Input Code Identifier
Final technical rept.
Phillips B. Scott. Jul 75, 51p RADC-TR-75-188
Contract F30602-74-C-0171
Distribution limitation now removed.

Descriptors: *Word recognition, Pattern recognition, *Coding, Voice communications, *Speech recognition, Automatic, Acoustics, Alphanumeric data, Magnetic tape, Males, Display systems, Computer programs, Errors, Phonetics, Identification.
Identifiers: Speakers(Human), Computer software.

No abstract available.

AD-709 638/CP HC A15 MF **A01**
General Dynamics/Electronics Rochester N Y
Scate Mark V, Feasibility Demonstration.
Final technical rept. (Volume 1) 1 Jul 68-20 Oct 69
Clifford C. Price. Jan 70, 333p
Contract DAAB07-68-C-0440

Descriptors: *Communication systems, Maintenance, *Electronic equipment, Maintenance, *Test equipment(Electronics), Design, Feasibility studies, Computer programs, Ground support equipment, Instruction manuals, Automation.
Identifiers: Scate marks.

The report summarizes the results of a feasibility demonstration of SCATE MK V held at the Contractor's plant in Rochester, N. Y. on 11 and 12 September 1969. SCATE MK V is a new generation of computer-controlled automatic test equipment (CATE) designed for field maintenance of Army communications and electronics equipment. It significantly reduces the size, programming costs and technical training requirements of support equipment while providing more comprehensive test and diagnostic capability than other systems in use today. Stimulus, measurement computer and switching subsystems are described, including specification data for each subsystem unit. SCATE MK V can be programmed to perform performance and fault diagnosis testing down to the replaceable module or subassembly level. The SCATE English-language programming language and interpretive compiler is described and a programmer's manual is included. Test data taken during the demonstration is reproduced along with informative notes describing each test performed. The characteristics of SCATE MK V, in the areas of technical capability, size, weight, reliability, maintainability, personnel subsystems, shelter mounting, training requirements, cost and bulk of test programming are discussed. (Author)

AD-711 001/CP HC A05 MF **A01**
Naval Postgraduate School Monterey Calif
Analysis of a Pseudo-Noise Addressing System for Multiple Access Communication with Applications of Error-Correcting Codes.
Master's thesis
Oscar M. Bull. Jun 70, 89p

Descriptors: *Coding, Errors, *Space communication systems, Radio transmission, Multiplex, Statistical functions, Correlators, Signal-to-noise ratio, Computer programs, Probability, Detection, Pulse communication systems, Pulse code modulation, Simulation, Theses.
Identifiers: *Error correction codes, Convolutional codes, Data transmission, Random Access Discrete Address, Random sequences, Block codes, Computerized simulation.

The thesis describes several modulation schemes to be used in a random access discrete address (RADA) system. This RADA system uses only one common frequency as carrier, and no synchronization of the net is supposed. Recognition of the transmissions between pairs of talkers involves the use of pseudo-random sequences as individual addresses of each subscriber. Detection of a particular pseudo-random sequence, contaminated by the noise formed by the simultaneous transmissions of other sequences, is accomplished by correlation methods. A comparative study is presented for the transmission of the information by the RADA system. The following methods are described and analyzed: an M-ary system, where the information is represented by cyclic shifts of the pseudo-random sequence used as the recipient's address, and pulse code modulation (PCM) where the information is represented by a '1' or '0'. Finally, the effect of encoding the information digits via error-correcting codes is investigated. Here, use of cyclic block codes and convolutional codes are presented. It is concluded that the use of convolutional codes would improve the performance of RADA systems. (Author)

AD-712 102/CP HC A04 MF **A01**
Cybernetic Research and Development Corp Princeton N J
Advantages of Quick-Look Pattern Recognition in Air Force Signal Analysis.
Final rept.
Alfred Engel, and David M. de Ferranti. 24 Aug 70, 69p AFOSR-70-2409TR
Contract F44620-70-C-0090

Descriptors: *Signals, *Pattern recognition, *Speech recognition, Programming(Computers), Signal-to-noise ratio, Adaptive systems, Digital computers, Computer programs, Fourier analysis, Information retrieval, Communication systems, Suppressors.

Up to 100 time slices and 10 harmonics of visible speech are derived from one single Fourier series. The method assumes a signal-to-noise ratio of better than 1:10. Emphasis has been put on both beat frequency enhancement and carrier suppression. Execution times close to real time were achieved on an IBM 360 Mod 91. Program listings appended to report. (Author)

AD-713 674/CP HC A08 MF **A01**
Rome Air Development Center Griffiss AFB N Y
A New Satellite Multiple Access Technique.
Technical rept.
John J. Patti. Sep 70, 159p Rept no. RADC-TR-70-167
Master's thesis.

Descriptors: *Communication satellites(Passive), Radio signals, *Radio transmission, Signal-to-noise ratio, Transmitter-receivers, Statistical analysis, Monte Carlo method, Transformations(Mathematics), Vector analysis, Power spectra, Spectrum analyzers, Phase shift, Frequency modulation, Computer programs, Integral transforms, Integration.
Identifiers: Computerized simulation, Chi square test.

The Second Order Coherent Multiple Access (SOCMA) technique is proposed to satisfy the simultaneous demands of a large group of communications satellite users. The three basic satellite multiple access techniques, time, frequency, and code division techniques, are briefly reviewed. The performance of SOCMA is evaluated and compared to that of the three basic techniques. The analysis uses random waveform computer simulation to investigate the SOCMA performance. The goodness of the random waveform simulation, in terms of simulation precision, is evaluated by application of the Chi-Square test. For this evaluation, a Quadratic/Gradient optimization algorithm is formulated which approximates the Chi-square surface in a local neighborhood of the mean and standard deviation by a parabolic surface. Utilizing this algorithm, a minimum Chi-square is found which yields the best fit of the normal distribution to the sample histogram distribution. (Author)

AD-715 121/CP PC **A17** MF **A01**
General Dynamics/Electronics San Diego Calif
Study of Electronic Handling of Mail. Completion Report for Work Task 5. Transmission Methods.
Jul 70, 388p* Rept no. R-69-046-05
Contract RER-30-70
See also AD-715 120 and AD-715 122.

Descriptors: *United States Government, *Communication systems, *Data transmission systems, Electronic equipment, Digital computers, Broadband, Cost effectiveness, Mathematical models, Communication satellites(Active), Analog computers, Systems engineering, Multiplex, Coaxial cables, Errors, Control systems.
Identifiers: *Mail, *Electronic mail handling.

The purpose of the report is to provide the basic information required to do preliminary systems engineering in transmission methods, and to make valid cost estimates of proposed system approaches. Emphasis is placed on the compilation and description of basic communication techniques that are potentially useful for the electronic transmission of mail, in both analog and digital form; presentation of information on terminal and transmission subsystems that will give an overview of potentially useful technologies; demonstration of practical transmission system design approaches, for use in preliminary appraisals of different transmission media and methods: and provision of rational basis for estimating the recurring and nonrecurring costs of transmission systems, so that trade-off studies can be made to assist in the choice of methods to be used. (Author)

AD-721 179/CP MF **A01**
Office of Telecommunications Boulder Colo Inst for Telecommunication Sciences
A New Method for Predicting HF Ground Wave Attenuation Over Inhomogeneous, Irregular Terrain
Research rept.
R. H. Ott. Jan 71, 63p Rept no. OT/ITSSR-7
Availability: Paper copy available from SOD as C1.60:7 $0.60.

Descriptors: *Radio waves, Attenuation, Terrain, Radio transmission, High frequency, Predictions, Computer programs, Numerical analysis.

Several examples of the numerical evaluation of an integral equation for the calculation of the attenuation of a radio wave are given. These waves are assumed to be propagated over realistic, smoothly varying irregular, inhomogeneous terrain. Results for propagation over a cylindrical earth show an accuracy to 3-4 significant figures when compared with the classical residue series. Calculations for propagation over smooth mixed land-sea paths agree with classical methods. The applicability of the program to permit computation of propagation over terrain with smooth height variation is demonstrated by calculations of propagation over one and two Gaussian-shaped hills. The ability of the program to allow treatment of variations in both ground conductivity and height combined is illustrated by calculations of propagation from the sea up a sloping beach and by calculations of propagation over an island. The last example illustrates the importance of the terrain profile in mixed path calculations. (Author)

AD-731 574/CP PC **A03** MF **A01**
Alaska Univ College Geophysical Inst
Project SECEDE. Tracking Barium releases using the TV-TRACK System
Technical rept. 16 Dec 70-30 May 71
T. Neil Davis, and S. P. Geller. 20 May 71, 42p TR-2, RADC-TR-71-195
Contract F30602-70-C-0179, ARPA Order-1057

Descriptors: *Atmospheric sounding, Upper atmosphere, *Condensation trails, Optical tracking, Television equipment, Real time, Computer programs, Digital recording systems, Position finding.
Identifiers: SECEDE project, *Chemical release studies, Barium clouds, INTERDATA-4 computer program.

Described herein is a TC tracking system capable of real-time visual object tracking. The total system consists of low-light TV cameras and communications allowing for data to be sent from remote sites to a small centrally located computer. The position of the object that the three cameras are observing is calculated by the computer and transmitted to other sites for the purpose of 'pointing' other equipment. Solutions are available once per second. This report describes the actual use of this system during the SECEDE 2 test series and some problems encountered. It also contains enough detailed information to allow duplication of the system software or to extract certain portions of it that may be useful to other applications. (Author)

AD-736 115/CP PC **A03** MF **A01**
Naval Postgraduate School Monterey Calif
Models for Message Transmissions and Interference-Caused Retransmission through a Multi-Channel Satellite Communications System
Master's thesis
Charles William Jones. Sep 71, 37p

Descriptors: *Radio relay systems, Communication satellites(Active), *Information theory, Radio relay systems, Computer programs, Mathematical models, Radio transmission, Theses.
Identifiers: Multichannel communication, Computerized simulation.

A satellite communication system has been proposed for use in improving naval communications. This system would feature random selection of channels by originators. An expression is developed for the probability that a specified number of messages, s, of n original messages, will be received successfully after being transmitted a number of times, m. An expression is derived for the probability that a specified number of messages, j, of n original messages, will be received successfully on the first transmission by some arbitrary time, t. A Monte Carlo computer simulation is conducted and is the basis for expressions for the maximum number of times any unit would have to transmit to be received successfully. (Author)

AD-738 178/CP PC **A09**/MF **A01**
Moore School of Electrical Engineering Philadelphia Pa
Pennsylvania-Princeton Army Avionics Research Program. Army Aircraft Communication Task
Final technical rept.
Fred Haber. Dec 71, 178p 72-13, ECOM-02411-26
Contract DA-28-043-AMC-02411(E)

Descriptors: *Communication systems, *Army aircraft, *Air traffic control systems, Communication systems, Digital systems, Air-to-air, Attenuation, Radio navigation, Air-to-surface, Computer programs, Multipath transmission, Advanced planning, Air-to-air.
Identifiers: Digital communication systems, Avionics.

The objective was to pursue Army Aircraft requirements anticipated in the 1970-1980 time interval, including requirements for navigation, identification, and landing systems; the use of random access techniques; experiment on, and analysis of, the propagation environment of Army aircraft; and methods for reducing effects of fading resulting from strong specular reflections. (Author)

AD-740 119/CP PC **A07**/MF **A01**
California Univ Berkeley Operations Research Center
A Multi-Commodity Concave Cost Minimization Problem for Communication Networks
Research rept.
Sen Subhabrata. Feb 72, 132p Rept no. ORC-72-5
Contract DA-31-124-ARO(D)-331

Descriptors: *Telephone communication systems, Mathematical models, *Mathematical programming, Optimization, Networks, Synthesis, Convex sets, Curve fitting, Graphics, Costs, Algorithms, Computer programs, Theses.
Identifiers: Network analysis theory, *Network synthesis, Concave programming, Network flows, FORTRAN 4 programming language, FORTRAN.

In this network synthesis problem a matrix giving flow requirements between each pair of points is specified, and the cost of flow in each arc is a concave function of the amount of flow. A flow pattern which fulfills the requirements at minimum cost is sought. The problem is formulated as a concave programming problem with linear constraints. All the practical difficulties of formulation and theoretical difficulties of identifying the globally minimal solution while avoiding locally minimal solutions are discussed. (Author)

AD-744 082/CP PC **A11**/MF **A01**
Philco-Ford Corp Willow Grove Pa Communications and Technical Services Div
Algorithms for Transceiver Modulation and Demodulation
Final technical rept. 20 Feb 70-6 Aug 71
Kenneth Abend, David L. Fletcher, Constantine Gamacos, and W. Andrew Wright. Jan 72, 241p 2580-F, RADC-TR-71-305
Contract F30602-70-C-0052

Descriptors: *Transmitter-receivers, Design, Digital systems, Modulation, Demodulation, Frequency synthesizers, Computer programs, Algorithms, Mathematical models, Real time, Time sharing.
Identifiers: Signal processing, Recursive filters, Heterodyning, Computerized simulation.

The report is devoted to the investigation of algorithms which reduce the complexity of a real-time digital processor for performing tactical transceiver functions of modulation, demodulation, frequency synthesis, heterodyning, and filtering. A minimum complexity design for a Multimode Digital Processing Transceiver was established through analytical investigations and computer simulations, and a breadboard was developed for experimental evaluation. (Author)

AD-744 467/CP PC **A03**/MF **A01**
Army Materiel Systems Analysis Agency Aberdeen Proving Ground Md
A Model for Teletype Communications Evaluation
Technical memo.
Larry F. Shanok, and Newell E. Quinton. Apr 72, 48p Rept no. AMSAA-TM-135

Descriptors: *Teletype systems, Mathematical models, Networks, Queueing theory, Computer programs, Tactical warfare, Army operations.
Identifiers: Performance evaluation.

The report describes an analytic model for the evaluation of teletype communication networks. The queueing model determines average delay by priority category for both full duplex teletype channels. The main body of the report provides the general concept of the model. The appendices must be read to gain the knowledge needed to exercise the model. The computer program is included. The model is particularly useful in ill-defined situations requiring the evaluation of many alternatives. (Author)

AD-749 678/CP PC **A18**/MF **A01**
California Univ Los Angeles School of Engineering and Applied Science
Adaptive Routing Techniques for Message Switching Computer-Communication Networks
Gary Lee Fultz. Jul 72, 425p Rept no. UCLA-ENG-7252
Contract DAHC15-69-C-0285
Also pub. as Computer Systems Modeling and Analysis Group Report Series 7.

Descriptors: *Data processing systems, Networks, *Data transmission systems, Information theory, Adaptive systems, Queueing theory, Algorithms, Stochastic processes, Mathematical models, Computer programs, Theses.
Identifiers: *Computer networks, ARPA computer network, Switching theory, Computerized simulation, Network analysis theory.

The report considers adaptive routing techniques applicable to message switching computer-communication networks such as the ARPA network. The emphasis of this research is on the prediction of average message delay and the specification, implementation and evaluation of various classes of message routing procedures. The report includes a one-page GPSS program. (Author)

AD-753 115/CP PC **A07**/MF **A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
Summary of the System, Support, and Special-Purpose Software Used by the Sanguine Simulation Facility
Technical note
Ira Richer, and Dale A. McNeill. 18 Sep 72, 140p TN-1972-31, ESD-TR-72-234
Contract F19628-73-C-0002

Descriptors: *Global communication systems, Extremely low frequency, *Communication equipment, Simulation, *Programming(Computers), Digital computers, Instruction manuals.
Identifiers: Varian 620/i computers, Sanguine project, *Computerized simulation, *Operating systems(Computers).

A computer facility, consisting of a Varian 620/i digital computer, associated peripherals, and extensive software, has been developed for analyzing and simulating communications systems. The software includes an operating system, general-purpose subroutines, and simulation programs. The report describes the software in detail, serving as a handbook for potential users and as a guide for setting up similar facilities. (Author)

AD-755 760/CP PC **A08**/MF **A01**
Naval Postgraduate School Monterey Calif
Fleet Multi-Channel Broadcast Traffic Intensity Study
Master's thesis
Harlan Daryl Oelmann. Jun 72, 162p

Descriptors: *Global communication systems, Multiple operation, *Teletype systems, Naval operations, Queueing theory, Data transmission systems, Mathematical models, Statistical tests, Feedback, Graphics, Computer programs, Theses.
Identifiers: Data transmission, Telecommunication.

The thesis contains the analysis of data of message traffic loads on the Naval Communications Fleet Multi-channel Broadcast System and results of a simulation model of the system under various channel alignments. Distributions of interarrival times, message lengths and requests for screens and reruns are determined from the data. These distributions are used in a simulation model of the Broadcast System. The model is used to compare the average delays caused by backlogs of messages when two channels devoted to a given shiptype are (a) used in series with the second channel used to rebroadcast messages from the first channel after a one hour delay, and (b) both channels are used in parallel to transmit first-run messages. The results of the simulation show that backlogs are reduced considerably by running the two channels in parallel at all times. (Author)

AD-755 846/CP PC **A07**/MF **A01**
Network Analysis Corp Glen Cove N Y
Survivability Analysis of Command and Control Systems
Final rept. 1 May-1 Nov 72
Howard Frank, and Ivan T. Frisch. Dec 72, 128p
AFOSR-TR-73-0195
Contract F44620-72-C-0080

Descriptors: *Command + control systems, Survival, *Communications central, Vulnerability, Combat information centers, Global communication systems, Threat evaluation, Damage assessment, Decision making, Kill probabilities, Mathematical models, Computer programs.

The Air Force Office of Scientific Research contracted with Network Analysis Corporation during the period 1 May 1972 to 1 November 1972 to conduct research on the survivability analysis of realistic command and control systems. The report summarizes the findings of the research project. During the first half of the project, effort was aimed at formulating meaningful survivability models and criteria, determining fundamental physical factors affecting survivability analysis and determining suitable approaches to the survivability problem. The second half of the study was aimed at the design and implementation of the probabilistic survivability analysis algorithm and at providing a practical demonstration of its use for a representative network problem. A description of the computer program developed and an example of its application are included in the report. (Author)

AD-755 918/CP PC **A07**/MF **A01**
Tracor Inc Austin Tex
Research on Diagnostic Evaluation of Speech Intelligibility
Final rept. 1 Feb 70-31 Aug 72
William D. Voiers, Alan D. Sharpley, and Carl J. Hehmsoth. 24 Jan 73, 138p TRACOR-T73-AU-9010-U, AFCRL-72-0694
Contract F19628-70-C-0182

Descriptors: *Voice communication systems, Scientific research, *Speech, *Intelligibility, Acoustics, Vocoders, Computer programs, Subroutines, Psychometrics.
Identifiers: Evaluation, Diagnostic rhyme tests, Speaker factors, Listener factors, Phonology.

The activities of the Psychometrics Department of TRACOR, Inc., fall into two major categories. In the first category are research activities undertaken with the aim of developing improved methods for evaluating voice communication systems and devices. In the second category are testing services performed with processed speech materials supplied by the contract monitor. The research activities included five major research projects from which technical papers resulted presented in the report. (Author)

AD-761 206/CP PC **A03**/MF **A01**
Signals Research and Development Establishment Christchurch (England)
A Simulation of A Complex Microelectronic Module Containing Analogue and Digital Elements
C. H. Jones. Oct 72, 32p SRDE-72027, DRIC-BR-34195

Descriptors: *Vocoders, Design, Modules(Electronics), Logic circuits, Wiring diagrams, Coding, Decoding, Computer programs, Great Britain.
Identifiers: Computerized simulation, Coders, Decoders, SD.

The report describes an attempt to simulate the complex functions present in a Delta Sigma Speech Coder based on the G.E.C. Mk 3 coder. The simulation is flexible allowing parameters such as supply volts, temperature, clock rates, and frequency and amplitude of the analogue signal to be varied, and show the resulting effects on the final digit stream. Details are also included for circuit improvements, resulting from the simulation, to give increased dynamic range to the coding process. Comparison between the simulated parameters and those measured on a smaple coder gave a close correlation. This led to a fuller understanding of the operation of what is essentially a complex oscillating feedback circuit.

AD-761 479/CP PC **A05**/MF **A01**
Naval Postgraduate School Monterey Calif
Computerized Management Tools for Use in the Analysis of Autodin Automatic Switching Centers and Associated Tributaries
Master's thesis
Robert Bruce McManis. Mar 73, 86p

Descriptors: *Global communication systems, Mathematical models, Telegraph systems, Digital systems, Queueing theory, Computer programs, Management engineering, Data processing systems, Switching circuits, Automatic, Theses, Teletype systems, Data transmission systems, Simulation.
Identifiers: Computerized simulation, Autodin(Automatic Digital Network), COBOL, Communications management, Switching theory, Defense communication system, Automatic digital network, N.

A general AUTODIN and Automatic Switching Center (ASC) system description is presented to orient the reader. A GPSS model of the Communications Data Processor (CDP) at the ASC was constructed, as a first step toward constructing an overall ASC simulation model. The capabilities and limitations of the simulation are discussed. Several experiments were conducted to ascertain the effects on the CDP message congestion and transit time of varying the volume of traffic passing through the system and the number of tributaries capable of receiving traffic. A COBOL program, which calculates queuing information for the ASC tributaries, is described. The results of the program output are interpreted and uses of the information produced are discussed. Conclusions are drawn concerning the performance of the AUTODIN ASC as shown by the simulation and porgram. Anticipated project applications are described. (Author)

AD-762 606/CP PC **E04**/MF **A01**
North Carolina State Univ Raleigh Dept of Electrical Engineering
Entropy Coded Adaptive Differential Pulse Code Modulation Systems for Speech Signals
Krishnamoorthy Virupaksha. 1 Jun 73, 93p
AFOSR-TR-73-1040
Contract F44620-69-C-0033

Descriptors: *Coding, Entropy, *Speech, Pulse code modulation, Statistical analysis, Band-pass filters, Signal-to-noise ratio, Probability density functions, Computer programs.
Identifiers: Themis project, Quantization, *Differential pulse code modulation, Computerized simulation, Signal processing, FORTRAN, AF.

The purpose of the work is to determine the utility of using entropy coding on the output of a Differential Pulse Code Modulation (DPCM) system designed for speech. DPCM systems with both adaptive and non-adaptive quantizers are considered. Only single integration predictors which do not change with time are studied here. Results are obtained for both uniform and minimum mean square error non-uniform quantizers. Speech signals in the presence of Gaussian noise are also considered. (Modified author abstract)

AD-762 910/CP PC **A04**/MF **A01**
Air Force Cambridge Research Labs L G Hanscom Field Mass
The Performance of 31 and 127 Bit Elastic Surface Wave Encoders and Decoders
Physical sciences research papers
Peter A. Devito, Paul H. Carr, and Thomas L. Szabo. 19 Dec 72, 59p Rept nos. AFCRL-TR-73-0736, AFCRL-PSRP-521

Descriptors: *Secret communication systems, Coding, *Transducers, Design, Communication equipment, Correlators, Delay lines, Decoding, Ultrasonic radiation, Performance(Engineering), Computer programs.
Identifiers: Surface waves, Acoustic surface waves, *Coders, *Decoders, Signal processing, Secure communication, Interdigital transducers, AF.

The use of elastic surface waves to generate and correlate a 31- and 127-bit maximal length biphase modulated code for secure anti-jam communications is given. Included is an experiment and theoretical study of the effect of temperature differences and doppler shifts on the performance of surface wave encoders and decoders. Data is given for the selection of the optimum sequence and materials for a given application. (Modified author abstract)

AD-763 592/CP PC **A04**/MF **A01**
Office of Telecommunications Boulder Colo Inst for Telecommunication Sciences
Power Spectra of Computer Simulated Frequency Modulation with Digital Minimum Shift Keying and Voice Input
Final rept. Feb 72-Mar 73
E. J. Dutton, and J. R. Juroshek. Mar 73, 74p
FAA-RD-73-56
Contract DOT-FA72WAI-268

Descriptors: *Voice communication systems, Frequency modulation, Information theory, Fourier analysis, Power spectra, Spectrum signatures, Graphics, Curve fitting, Computer programs, Frequency shift keyers.
Identifiers: FMSPECT computer program, FORTRAN, Signal processing, Computerized simulation, Data transmission, Fourier transformation, FAA.

A FORTRAN computer program, FMSPECT, which obtains the power spectrum of an FM signal, modulated by a voice signal, a digital signal, and combinations of both is presented. The theory behind the simulation of the voice signal (265-5575 Hz) is described, as well as the theory of simulating an MSK digital signal (2400 bits-per-second). The digital signal is multiplexed onto the voice at 7200 Hz for combined transmission. Sample spectra are shown for various modulation conditions, and the results are presented in the form of graphs and tables. A listing of the program is given in the appendix. (Author)

AD-765 517/8CP PC **A04**/MF **A01**
Varian Associates Palo Alto Calif
Transmitter Tube for Troposcatter Application
Final rept. Jun 70-Jul 71
A. Goldfinger. Jun 73, 73p ECOM-0228-F-70
Contract DAAB07-70-C-0228

Descriptors: *Klystrons, Microwave amplifiers, *Radio transmitters, Klystrons, Microwave communication systems, Tuning devices, Focusing,

Magnets, Heat exchangers, S band, Computer programs.
Identifiers: Troposcatter communication systems, Tropospheric scatter communication, A.

The program was directed toward further development and testing of a klystron amplifier. The goal was the fabrication and delivery of a practical field transmitter with an overall efficiency of 50%; the transmitter in this case is defined as the klystron tube, focusing mechanism, and cooling system. Efficiency is defined as the rf power output divided by the sum of the power inputs to the klystron amplifier, the focusing mechanism, and the cooling system. (Modified author abstract)

AD-765 687/9CP PC **E03**/MF **A01**
Naval Postgraduate School Monterey Calif
Analysis of a Random Communication Network by Simulation
Master's thesis
Nguyen dich Hung. Jun 73, 66p

Descriptors: *Communication systems, Networks, Information theory, Statistical analysis, Probability density functions, Mathematical models, Computer programs, Theses, Monte carlo method.
Identifiers: *Communication networks, Computerized simulation, FORTRAN, N.

In the paper a unified presentation is made on the results of various investigators on the properties of random communication networks. These results are interpreted in such a way that the properties may be determined by using a digital computer with the application of the Monte Carlo method. The computer program is written and tested. Results for some networks are compared with theoretical values. (Author)

AD-766 278/6CP PC **A99**/MF **A01**
Signatron Inc Lexington Mass
Nonlinear System Modeling and Analysis with Applications to Communications Receivers
Interim rept. Apr 70-Sep 72
James W. Graham, and Leonard Ehrman. Jun 73, 747p* RADC-TR-73-178
Contract F30602-70-C-0008

Descriptors: *Radio receivers, *Mathematical models, Nonlinear systems, Circuits, Analysis, Electromagnetic compatibility, Transfer functions, Computer programs, Diodes(Semiconductor), Transistors, Electron tubes.
Identifiers: Network synthesis, SIGNCAP I computer program, AF.

The objective was to develop reliable, realistic, and useful mathematical models of communication receivers that must operate in the presence of interfering signals. Major emphasis was placed upon understanding basic pehnomena and developing techniques needed to provide a capability of modeling receiver structures for multi-signal inputs. During the study considerable effort was placed upon modeling so that the effects of co-channel and adjacent channel interfering signals having arbitrary modulations in the presence of receiver nonlinearities might be effectively investigated. Therefore, methods of investigating quasi-linear systems having significant frequency selectivity were developed. Matters relating to intermodulation and crossmodulation distortion as well as gain compression, desensitization, and dynamic range were of primary concern. Associated with these developments was a companion effort to develop effective computer programs that will permit efficient practical application of the basic material presented in this work. (Modified author abstract)

AD-766 830/4CP MF **A01**
Michigan Univ Ann Arbor Systems Engineering Lab
On the Simulation of Radio-Linked Information Networks
Technical rept.
Gary J. O'Hara. Jun 73, 200p SEL-TR-71, 010749-9-T, ECOM-0058-71-72
Contract DAAB07-72-C-0058
Availability: Available in microfiche only.

Descriptors: *Data transmission systems, Simulation, Design, Networks, Very high frequency, Ultrahigh frequency, Computer programs.
Identifiers: GPSS programming language, FORTRAN, Computerized simulation, Data links, Radio links, Performance evaluation, A.

The report describes a programming package developed to simulate a class of radio-linked information networks. The class of networks considered includes data collection information systems in which data is simultaneously collected by many remote facilities and sent to a central processing facility. The simulation programs are explained in detail to enable the prospective user to decide whether the package is applicable for simulating a particular network and to furthermore enable him to make changes in the program provided. The simulation package is useful in determining various aspects of system performance. (Author)

AD-767 758/6CP PC **E07**/MF **A01**
University of Southern California Los Angeles Electronic Sciences Lab
Slant Transform Image Coding
Technical rept.
Wen-Hsiung Chen. May 73, 181p Rept no. USCEE-441
Contract F08606-72-C-0008, ARPA Order-1706

Descriptors: *Color television, Integral transforms, *Coding, Images, Bandwidth, Statistical analysis, Matrix algebra, Stochastic processes, Probability density functions, Pictures, Computer programs, Theses.
Identifiers: *Image processing, *Slant transformation, Fourier transformation, Hadamard transformation, Haar transformation, Karhunen-Loeve transformation, Quantization, Monochrome images, AF.

A slant transform matrix consisting of basis vectors which resemble typical lines of an image has been developed. A fast transform algorithm based on the matrix decomposition has also been presented. The transform has been proven to be superior, from the standpoint of image quality, to other transforms possessing fast computational algorithms. The statistical properties of the slant transform have been analyzed by introducing probability density and covariance models for the transform samples. The bandwidth reduction capability of the slant transform has been investigated by several test images. Two methods of achieving bandwidth reduction have been presented, namely, threshold and zonal coding. Studies have indicated that the average coding of a monochrome image can be reduced from 8 bits/pixel to 1 bit/pixel or 1.5 bits/pixel for the threshold and zonal coding, respectively, without seriously degrading the image quality. Studies have also indicated that zonal coding has an extremely high noise immunity, and can be practically implemented. The average coding of a color image can be reduced from 24 bits/pixel to 2 bits/pixel by zonal coding while preserving good quality reconstruction. (Author)

AD-767 906/1CP PC **A03**/MF **A01**
Syracuse Univ N Y
Antenna Pattern Distortion Computer Program
Technical rept.
Jose' Perini, and Kazuhiro Hirasawa. Aug 73, 43p* RADC-TR-73-230
Contract F30602-72-C-0360

Descriptors: *Antenna radiation patterns, *Computer programs, Distortion, Electromagnetic compatibility, Communication systems, Numerical analysis.
Identifiers: Honeywell 635 computers, FORTRAN 4 programming language, FORTRAN, AF.

Presently, when a new communication facility is designed, there is no simple way that the project engineer can predict the interaction between the many antennas that will be present in the facility. The available rules of thumb are too crude and do not really give any detailed information on the antenna pattern distortion or mutual coupling effects. Recent developments in the area of computer aided design of antennas allowed the development of a computer program that can perform an accurate analysis of the most common antenna installations with far more detail than has been possible. The description and usage of this program is the subject of the report. (Author)

AD-768 072/1CP PC **A04**/MF **A01**
IIT Research Inst Chicago Ill
Interference Mitigation Studies for Texas Telephone and Power Distribution Systems
Technical studies
James D. Huber, and Michael F. Genge. Jul 73, 59p Rept no. IITRI-E6249-1
Contract N00039-73-C-0030

Descriptors: *Telephone communication systems, Radiofrequency interference, *Transmission lines, *Radiofrequency interference, Extremely low frequency, Inhibition, Costs, Underground antennas, Computer programs, Texas, Electric cables, Telephone lines.
Identifiers: Sanguine project, N.

The document demonstrates the effects of various parameters associated with a Sanguine System on the interference mitigation of Texas Telephone and Power Distribution Systems. Cost models are presented, which were developed from this parametric study, for the mitigation of interference to these utilities. (Author)

AD-769 388/0CP PC **A03**/MF **A01**
Naval Postgraduate School Monterey Calif
Optimal Printer Configuration with Multiplex General Address Reading Device
Master's thesis
Michael Eugene Gilbertson. Sep 73, 44p

Descriptors: *Printers(Data processing), Communication equipment, Multichannel communications, High rate, Naval equipment, Communication and radio systems, Cost analysis, Computerized simulation, Printing equipment, Reading machines, Queueing theory, Message processing, Theses, Computer programs.
Identifiers: General address reading devices, N.

This study contains the analysis of the costs associated with the printing operation of the messages received from the Naval Communications Fleet Multi-Channel Broadcast System by a ship equipped with the Multiplex General Address Reading Device (GARD). A computer simulation is used to compare the average message delays for three different models of printers in varying quantities. Messages are accounted for by all four precedences. Costs of message delay and initial purchase price are used to compare the alternatives. The results of the study show that two high speed printers such as the TT-624 is the optimal configuration. (Author)

AD-769 434/2CP PC **A03**/MF **A01**
Naval Postgraduate School Monterey Calif
Selective Calling Device for the Mobile Maritime Service
Master's thesis
Vernon Christopher Hipkiss. Sep 73, 43p

Descriptors: *Communication and radio systems, Ship to shore, *Signals, Selection, Digital systems, Automation, Digital computers, Computer programs, Communication equipment, Warning systems, Automatic, Radio signals, Theses.
Identifiers: *Selective calling systems, N.

INTEL's MCS-4 micro computer set was selected to implement a digital selective calling device for use by the mobile maritime service. The system will generate and receive a standardized calling message. Upon receipt of a valid calling message, intended for the user, the system will activate visual and audible alarms. (Author)

AD-770 053/7CP PC **A06**/MF **A01**
General Electric Co Santa Barbara Calif Tempo
WEPH V Code Modifications for HF Propagation and System Performance Modeling
Topical rept.
Royden R. Rutherford. 19 Oct 73, 115p GE73TMP-20, DNA-3153T
Contract DNA001-72-C-0180

Descriptors: *Ionospheric propagation, High frequency, *Ionospheric disturbances, *Nuclear explosions, Electron density, Computer programming, Nuclear fireball, Ray tracing, Radio waves, Signal processing, Ionizing radiation, Communication and radio systems, Computations.
Identifiers: WEPH V computer code, D region, F region, SD.

The report describes modifications to the WEPH V code that permit the use of the code for evaluation of HF propagation and system performance in nuclear-disturbed environments. The propagation and system models are an extension of those presented in the DNA HF Communication Handbook (DASA 1955-1 and-2). The principal degradation effect modeled is D-region absorption. While changes in sky-wave geometry due to the disturbed environment are not determined, modifications to F-region critical frequencies at selected points are evaluated from approximate models. The modified WEPH V code is intended for use in rapid evaluation of the effects of propagation, system, and environment parameters on system performance, and to identify situations where analysis with detailed ray tracing codes such as the NUCOM code (DASA 2035) is required. (Author)

AD-771 758/0CP PC **A02**/MF **A01**
University of Southern California Marina Del Rey Information Sciences Inst
Encapsulation: An Approach to Operating System Security
Research rept.
Richard L. Bisbey, II, and Gerald J. Popek. Oct 73, 19p Rept no. ISI/RR-73-17
Contract DAHC15-72-C-0308, ARPA Order-2223/1

Descriptors: *Computer programs, *Protection, Encapsulation, Feasibility studies, Security, Time sharing.
Identifiers: Computer security, Operating systems(Computer), SD.

Currently, there does not exist a certifiably secure, multiuser operating system. No operating system has been able to withstand malicious attacks by skilled penetrators. Nevertheless, there exists a strongly felt need, both in the military and civilian sectors, for reliably secure operating system software. At the same time, any solution to the security problem must take into account the enormous investment in existing equipment and software. Encapsulation, is proposed for batch and RJE systems. It involves the use of a small amount of additional hardware and verified software. The resulting system can be certified to be secure, and is suitable for stringent military requirements. The solution is applicable, essentially unchanged, to a wide class of hardware and software, and it is insensitive to special versions of, or changes to, operating system code. Operating efficiency and costs of construction are discussed in this paper to demonstrate the feasibility of encapsulation. (Modified author abstract)

AD-771 958/6CP PC **A15**/MF **A01**
Control Data Corp Ottawa (Ontario) Ottawa Operations
Tactical Routing Indicator Look-Up and Header Preparation Device (TACRAHD)
Final rept. 1 Jan-1 Oct 73
Rachard R. Steele, David E. Connelly, and Wilhelm J. Kok. Nov 73, 327p CDC-R583/110/PR, ECOM-0189-F
Contract DAAB07-72-C-0189
See also AD-759 944.

Descriptors: *Message processing, *Tactical communications, Computer programs, Optical scanning, Distribution, Routing, Digital systems.
Identifiers: TACRAHD(Tactical Routing Indicator Lookup and Header Preparation Devices), Tactical routing indicator lookup and header preparation devices, A.

The Tactical Routing Indicator Lookup and Header Preparation Device, Advanced Feasibility Model (TACRAHD) is designed to accept input data from the Tactical Page Reader. The input data is stored in TACRAHD, while the message header is validated by checks on both its format and security levels, and a set of unique routing indicators is determined. Invalidities are indicated to the operator by means of a front panel display in order that corrective action may be taken, usually through the use of the front mounted typewriter keyboard. Security invalidities are announced by an audible alarm. Upon successful completion of header validation and routing indicator lookup, both message and header are reformatted in accordance with front panel switch selections, and are transmitted to the communications network. (Modified author abstract)

AD-773 388/4CP PC **E10**/MF **A01**
Southern Methodist Univ Dallas Tex Information and Control Sciences Center
Development of a Configuration Concept of a Speech Digitizer Based on Adaptive Estimation Techniques
Final rept.
James L. Melsa. 31 Aug 73, 338p
Contract DCA100-72-C-0036

Descriptors: *Information theory, *Speech, *Kalman filtering, Signal processing, Data transmission systems, Coding, Stochastic processes, Transfer functions, Estimates, White noise, Sensitivity, Identification, Computer programs, Computations.
Identifiers: Sensitivity analysis, Maximum likelihood estimation, Data transmission, *Sequential estimation, SD.

The report describes the results of a fifteen month contract to study the feasibility of using sequential estimation techniques for speech digitization. The original goals of this contract were to analyze several sequential estimation algorithms for possible use in speech digitization and then to select an algorithm for detailed study. In addition, a new residual encoding structure was developed as a byproduct of this study and it has been given preliminary investigation for concept feasibility. All of the stated goals of this study have been met and it has been shown that the sequential linear Kalman filter algorithm can: Yield high quality synthetic speech in a pitch synchronous mode; Operate in real time with the use of realistic parallel hardware; Be used in a residual encoding structure with good results without the use of pitch information. The conclusion is that the Kalman filter algorithm offers a meaningful alternative approach to the existing batch process algorithms. The output speech produced during this study compares very favorably with the speech obtained by other methods. (Author)

AD-774 082/2CP PC **A03**/MF **A01**
Naval Electronics Lab Center San Diego Calif
3-to-1 Data Compression Via Walsh Transform
Research and development rept. FY 73 and FY 74
D. C. McCall. 10 Dec 73, 35p* Rept no. NELC-TR-1903

Descriptors: *Data compression, *Walsh functions, *Coding, Data processing, Images, Pattern recognition, Computer programs, Digital systems.
Identifiers: *Walsh transformation, Image processing, N.

Naval Electronics Laboratory Center (NELC) has emulated a Walsh transform source encoder. This data compression technique has given three-to-one compression while maintaining good image fidelity. A digital frame capture unit (DFCU) is used to digitize images into a format suitable for processing on a digital computer. The encoder is emulated with a digital computer program that processes the digitized images. These processed images can then be displayed on the TV monitor of the DFCU for evaluation. Greater compression is feasible. (Author)

AD-775 163/9CP PC **A05**/MF **A01**
Kansas Univ/Center for Research Inc Lawrence
A Study of (AFCS) Communications Measurement Program
Final rept. 18 Feb 72-18 Feb 73
A. M. Breipohl, K. Sam Shanmugam, and Harvey Doemland. Nov 73, 95p RADC-TR-73-312
Contract F30602-72-C-0229

Descriptors: *Radio receivers, Mathematical models, Modulators, Noise(Electrical and electromagnetic), Microwave communications, Computerized simulation, Computer programs.
Identifiers: AF.

The objective of this work was to study the current measurement procedures used by the Air Force Communications Service (AFCS) for monitoring the performance capabilities of the microwave communications systems used by the Air Force and to develop additional measurement procedures to supplement the current procedures. The approach used to achieve the objectives consists of developing simple mathematical models for the various functional blocks in the communication system, selecting a set of important parameters of the model, relating values of functional block parameters to communications systems parameters, and developing procedures for measuring the values of these parameters. (Author)

AD-776 399/8CP PC **A07**/MF **A01**
IIT Research Inst Chicago Ill
EMP Response of Parabolic Reflector Antennas
Final rept.
P. P. Toulios, and Y. Shiau. Dec 73, 138p Rept no. IITRI-E6276
Contract DAAG39-73-C-0189

Descriptors: *Parabolic antennas, Electromagnetic pulses, Response, Satellite communications, Mathematical analysis, Computer programs.
Identifiers: A.

A theoretical investigation was conducted to approximately determine the electromagnetic pulse (EMP) response of Satellite Communications Antenna Systems (SATCOM). The ultimate objective is to be able to estimate system susceptibility to an EMP environment.

AD-776 783/3CP PC **E09**/MF **A01**
Air Force Inst of Tech Wright-Patterson AFB Ohio School of Systems and Logistics
A Computer Simulation of a Base Telecommunication Center
Master's thesis
William E. Glaesemann, and Robert J. Robinson. Jan 74, 249p Rept no. SLSR-8-74A

Descriptors: *Communications central, Computerized simulation, Communication and radio systems, Teletype systems, Computer programs, Message processing, Theses.
Identifiers: AF.

The purpose of the study was to examine the use of computer simulation as an analytical aid in the management of a Base Telecommunications Center. The report discusses the communications system in general and the Base Telecommunications Center in specifics. The management areas in which a computer simulation might be helpful are discussed. The nature of the populations of the variables and the problems used to define the boundaries of the system being modeled are presented and examined. The message processing times are used as a significant measure of performance in a Telecommunication Center. The simulation output is compared to the output of the WPAFB Base Telecommunications Center and the differences are discussed. The simulation output is examined to determine its usefulness in determining the effect of different types of equipment, shift schedules, and system changes. The possibility of using a simulation to determine minimum requirements in terms of personnel and equipment was examined. (Modified author abstract)

AD-777 198/3CP PC **A07**/MF **A01**
Illinois Univ Urbana Coordinated Science Lab
Computer Simulation of Error-Correcting Codes
Master's thesis
Norman Steven Janoff. Sep 73, 149p Rept nos. R-622, UILU-ENG-73-2224
Contract DAAB07-72-C-0259, DAAB07-71-C-0292
Sponsored in part by Contract F30602-72-C-0031 and Grant NSF-GK-24879.

Descriptors: *Error correction codes, *Computerized simulation, Decoding, Communication and radio systems, Computer programs, Frequency shift keyers, Tropospheric scatter communications, Very high frequency, Logic circuits, Theses.
Identifiers: Majority logic decoding, Reed-Solomon codes, Golay codes, A.

The purpose of the thesis is to examine the error correcting ability of error-correcting codes on real communication channels. Topics discussed include the following: Bounded distance decoding; interleaved codes; error control coding based on majority-logic decoding; Reed-Solomon codes; and, diffuse threshold-decoded codes.

AD-777 268/4CP PC **E05**/MF **A01**
Air Force Inst of Tech Wright-Patterson AFB Ohio School of Engineering
Energy Spectra for Frequency-Shift-Keyed Signals Transmitted by Synchronously Resonated, Very Low Frequency Antennas
Master's thesis
Tee R. III Hadley. Dec 73, 100p Rept no. GE/EE/73A-10

Descriptors: *Antennas, *Frequency shift keyers, Spectra, Frequency shift, Very low frequency, Resonance, Data transmission systems, Digital systems, Spectrum analysis, Resonators, Broadband, Theses, FORTRAN, Computer programs.
Identifiers: Electronic broadbanding, CDC 6600 computers, AF.

Electronic broadbanding is a technique whereby very low frequency (VLF) antennas can be resonated (retuned) synchronously with a frequency-shift-keyed (FSK) signal for transmission of binary data at rates well over 1000 baud. The thesis investigates the transmitted energy density spectrum for an electronically broadbanded VLF antenna system in which a frequency shift can occur only at the instant of an antenna-current zero-crossing with positive slope. A computer solution shows that the transmitted spectrum is approximately equivalent to the spectrum of an ideal, constant amplitude, FSK signal. A further investigation, again by computer program, shows that if the total frequency shift between the marking and spacing frequencies occurs over a finite period, rather than instantaneously, then the spectrum's sidelobes will be reduced significantly. (Modified author abstract)

AD-777 501/8CP PC **E01**/MF **A01**
Army Electronics Command Fort Monmouth N J
FOREST - A Computer Program to Compute Radio Loss Between Two Antennas Embedded in a Forest Environment
Research and development technical rept.
George E. Krause. Apr 74, 27 Rept no. ECOM-4212

Descriptors: *Radio transmission, *Computer programs, Radio waves, Forests, Environments, Losses, Dipole antennas, Very high frequency, Attenuation, FORTRAN.
Identifiers: FOREST Computer program, A.

Computer Program Forest, is the computer adaption of a mathematical model to compute radio loss between two dipole antennas embedded in a forest environment for the 2 to 200 MHz frequency range. The model was reported in an article titled Radio Loss of Lateral Waves in Forest Environments by Dence and Tamir which appeared in the April 1969 issue of Radio Science. It assumes the transmission mode is a wave traveling laterally, at the forest-air interface, from the transmitting to the receiving site. The computer program is written in Fortran for use in the time-share mode on the Burroughs B5700 computer. A single frequency and single distance may be specified, or up to ten frequencies at from to ten distances may be called for. The program contains parameters to typify thin, average and dense forests, or the user can enter specific parameters when they are known. (Author)

AD-777 897/0CP PC **A09**/MF **A01**
Philco-Ford Corp Palo Alto Calif Western Development Labs Div
Performance of Soft Limiting PSK and DPSK Spread Spectrum Systems
Final rept. Nov 72-Oct 73
J. J. Jones, J. Y. Huang, and W. K. S. Leong. Feb 74, 192p WDL-TR-5417, RADC-TR-73-421
Contract F30602-73-C-0075

Descriptors: *Radio links, Spread spectrum, Retransmission, Phase shift circuits, Repeaters, Satellite communications, Errors, Probability, Jamming, Computerized simulation, Computer programs, Data transmission systems, Pulse communications, Digital systems, FORTRAN.
Identifiers: FORTRAN 4 programming language, AF.

An analytical study and investigation is carried out to model a phase-coded spread-spectrum communication system containing a soft-limiting satellite repeater. Useful mathematical expressions are obtained for the bit error probability for both coherent PSK and differential PSK biphase data modulation combined with phase-coded biphase or quadriphase spread-spectrum modulation. A study of soft limiter models is performed, resulting in the selection of the error function amplitude characteristic to represent the soft-limiting repeater nonlinearity. The error function model provides the flexibility to represent all degrees of soft limiting from a linear repeater to a hard-limiter. Included in the study are the effects of both up-link and down-link noise as well as CW jamming at the limiter input. (Modified author abstract)

AD-778 237/8CP PC **E07**/MF **A01**
Computer Sciences Corp Falls Church Va
Communications Support Requirements (COMSR) Study. Volume 8, Appendix C
Final rept. Nov 72-Dec 73
Arthur W. Reese, and Arnold M. Rathlev. 15 Dec 73, 171p
Contract DAAG11-70-C-0875
See also AD-778 179.

Descriptors: *Communications central, *Army operations, *Communication and radio systems, *Data bases, *Tactical communications, *Computer programs, Combat information centers, Computerized simulation, Requirements, Planning.
Identifiers: A.

The appendix contains the documentation for the computer programs developed during the contract. The programs are grouped into three categories depending on the major input file: (1) Force Model, (2) Intra-Unit COMSRs, and (3) Inter-Unit COMSRs. Each group of programs contains a narrative, MACRO level flowcharts, input formats, output samples, program listings, Job Control Language listing, and MICRO level flowcharts.

AD-778 635/3CP PC **E05**/MF **A01**
Naval Postgraduate School Monterey Calif
An Interactive Graphics Approach to the Flight Deck Handling Problem
Master's thesis
Thomas Joseph Giardina, II. Mar 74, 99p

Descriptors: *Command and control systems, *Interactive graphics, Computer graphics, Computer programs, Data processing terminals, Display systems, Flight decks, Operation, Handling, Carrier based aircraft, Aircraft carriers, Communications networks, Computers, Interactions, Man machine systems, Problem solving, Graphics, FORTRAN, Theses.
Identifiers: FORTRAN 4 programming language.

Present communication networks aboard aircraft carriers introduce inefficiency into the aircraft handling operation. A previous study, named CADOCS, failed to solve the problem by a method involving computer simulation. This study proposes a solution to the aircraft handling problem by use of a system of computer graphics terminals and interactive or 'man-in-the-loop' programming. The study includes a proposed communication network, a discussion of the types of computer graphics hardware now available, a discussion of interactive programming, and a preliminary computer graphics program for two displays in the proposed system. (Author)

AD-778 683/3CP PC **A08**/MF **A01**
Michigan Univ Ann Arbor Cooley Electronics Lab
Investigation of the Propagation Stability of a Time Spread Underwater Acoustic Channel
Technical rept.
Raymond L. Veenkant. May 74, 175p* Rept nos. TR-226, 004860-4-T
Contract N00014-67-A-0181-0035

Descriptors: *Underwater sound, *Signal processing, *Information theory, Multipath transmission, Correlation techniques, Stochastic processes, Hydrophones, Power spectra, Computer programs, Florida Strait, Theses.
Identifiers: MIMI project.

An experimental investigation of analysis and display techniques for extracting stability information from underwater acoustic propagation data has shown the feasibility and usefulness of a specific display format called the Channel Digit Response. All of the complex nature of the channel reception is retained in the display, but the format compresses the data and enhances the extraction of qualitative stability information. The investigation and conclusions are limited to propagation tests using periodic transmissions, as periodic transmissions are the usual type used for studying varying multipath propagation. The investigation data base spanned 133 hours, from a 43 n. mile range across the Straits of Florida. The effective time resolution of the data was .02 seconds. Crosscorrelation, autocorrelation, and power spectrum analysis, and several threshold techniques based on time-lag crosscorrelation were investigated, and their effectiveness compared to the Channel Digit Response. (Author)

AD-778 947/2CP PC **A07**/MF **A01**
Harris-Intertype Corp Melbourne Fla Radiation Systems Div
Recursive Algorithms for Adaptive Array Antennas
Final technical rept. Jun 72-Jun 73
Charles A. Baird, Jr. Mar 74, 150p RADC-TR-74-46
Contract F30602-72-C-0499

Descriptors: *Antenna arrays, Algorithms, Recursive functions, Signal processing, Data transmission systems, Digital systems, High rate, Antennas, Computers, Control, Phased arrays, Antijamming, Pulse communications, Computer programs, Antenna radiation patterns, Kalman filtering, Adaptive systems.

The techniques define digital control algorithms based on least squares estimation methods to adjust the parameters of a multichannel array filter to perform automatic null steering. The algorithms are designed to converge to the optimal filter parameters (array weights) defined by the solution of a set of linear algebraic equations (a Wiener-Hopf type equation), and their relationship to Kalman filtering methods are discussed. Both convergence analysis and simulations demonstrate rapid convergence behavior; however, accurate computations appear to be required for some cases due to ill-conditioning of these equations. The basic recursive algorithm is derived for use with desired signal approximations, and several techniques for signal acquisition are discussed and simulated. Also, alternative algorithm forms based on using desired signal direction of arrival information are developed and simulated. Finally, the performance of the basic recursive algorithm is compared, through simulations, to the gradient (LMS) and random search methods. (Modified author abstract)

AD-779 086/8CP PC **A05**/MF **A01**
IIT Research Inst Annapolis Md
An Automated FAA Frequency Assignment System
L. Beall, R. Crisafulli, J. Morrow, and S. Vangaasbeck. Dec 73, 95p FAA-RD-73-184
Contract F19628-73-C-0031, DOT-FA70WAI-175

Descriptors: *Air traffic control systems, *Frequency allocation, Very high frequency, Communication and radio systems, Automation, Frequency, Management, Electromagnetic interference, Matrices(Mathematics), Computer programs.

An automated frequency assignment system is developed as a means of providing frequency assignment plans for FAA Air Traffic Control (ATC) VHF communications facilities in the continental United States. The system is implemented by means of a series of computer programs (described herein) designated collectively as the Frequency Assignment System (FAS). FAA-supplied ATC data is used to build an intersite channel-separation matrix which serves as input to the assignment process. Assignment techniques are developed that make maximum use of the available spectrum. Descriptions are included on how the frequency manager can vary the program inputs to investigate the advantages of different assignment procedures. (Author)

AD-779 867/1CP PC **A05**/MF **A01**
Naval Electronics Lab Center San Diego Calif
A Program for Computing Earth Ionosphere ELF/VLF Excitation Factors for Satellite-Borne Antennas
Interim rept.
Richard A. Pappert, and Linda R. Shockey. 1 Apr 74, 79p Rept no. NELC-IR-741

Descriptors: *Ionospheric propagation, *Satellite communications, Satellite antennas, Computer programs, Extremely low frequency, Very low frequency, Excitation.

The report presents a variation of an earlier fields program. This variation is designed specifically for the purpose of calculating excitation factors of the earth-ionosphere wave guide by point dipoles at satellite heights. In particular, allowance is made for the following: (1) provision for calculating excitation factors for all electric field components, E sub x, E sub y and E sub z; (2) provision for calculating excitation by both electric and magnetic point dipoles; (3) provision for calculating excitation by vertical, horizontal end on and horizontal broadside configurations. (Author)

AD-780 461/0CP PC **E03**/MF **A01**
Technology Service Corp Santa Monica Calif
Revision to the Frequency Tracking and Estimation Program (Phase-Locked Loop)
Technical rept.
Roger M. Golden, and William B. Kendall. Feb 74, 46p Rept no. TSC-PD-067-21
Contract N00014-71-C-0033

Descriptors: *Phase locked communications, *Phase locked systems, Frequency, Tracking, Signal processing, Satellite communications, Electronics, Computer programs.

A number of modifications have been incorporated into the Frequency Tracking and Estimation Program (Phase-Locked Loop). The modifications improve the tracking properties of the PLL as well as make the program more convenient to use. A summary of the modifications along with a description of all of the parameters needed by the program is given in this report. (Author)

AD-781 185/4CP PC **A07**/MF **A01**
Clarkson Coll of Technology Potsdam N Y
Analysis and Design of Switching Components for a TDM Communication System
Phase rept.
Rangaswamy Mukundan, and Kenneth K. Jackson. Mar 74, 136p RADC-TR-74-32
Contract F30602-72-C-0463

Descriptors: *Time division multiplexing, *Switching, Communication and radio systems, Time, Switches, Computerized simulation, Computer programs.

In modern communication systems, expansion of facilities without increases in cost or size of plant is a goal. Time Division Multiplexing (TDM) can achieve this goal by using sophisticated hardware. Improvements in signal path components such as contacts, filters, and gate driving circuitry give the desired level of sophistication. JFET technology is shown to be useful for contact circuits, while giving good transmission performance. PCAP (Princeton Circuit Analysis Program) simulation and hardware modelling are used to illustrate and substantiate Resonant Transfer TDM concepts. The purpose is to propose elements of a TDM switch meeting future requirements using the work accomplished here as a basis. The system serves 256 lines per highway and is integrated circuit oriented. Capacity is estimated at 2048 lines. (Author)

AD-781 845/3CP PC **A03**/MF **A01**
Naval Underwater Systems Center New London Conn New London Lab
Error Probability Characteristics for Orthogonal Multiple Alternative Communication with D-Fold Diversity
Technical rept.
Albert H. Nuttall. 19 Jun 74, 48p Rept no. NUSC-TR-4769

Descriptors: *Communication and radio systems, *Information theory, Signal to noise ratio, Fading(Electromagnetic waves), Probability density functions, Statistical analysis, Computer programs, Signal processing.

The error probability characteristics for orthogonal multiple alternative (M-ary) communication with D-fold diversity are plotted for M = 2, 3, 4, 8, 16, 32, 64 and for D = 1, 2, 3, 4, 5, 6, 8, 12, 16, 24, 32, 48, 64 in a range of M-ary character error probabilities Pe from 0.1 to 0.00001. The curves are plotted in two ways - versus the total signal-energy- to-noise-density ratio and versus the signal-energy-to-noise-density ratio per diversity branch. These curves permit quick determination of the optimum number of diversity branches D to employ for specified values of M and Pe and the required average total received signal-energy-to-noise-density ratio. The curves also afford quantitative measures of the losses incurred by not employing the optimum number of diversity branches, such as might be imposed by a limited bandwidth. Bandwidth requirements are discussed for frequency diversity, and a signal design example using the above curves for a simple tradeoff study is presented. (Author)

AD-781 862/8CP PC **E05**/MF **A01**
Naval Postgraduate School Monterey Calif
A Prototype Ring Interface for the NPS Data Communication Ring
Master's thesis
Michael James Harris. Jun 74, 110p

Descriptors: *Communications networks, *Computers, Interequipment communication, Control, Interfaces, Data transmission systems, Computer programs, Programming languages, Theses.
Identifiers: *Computer networks, SMAL programming language.

The architecture and hardware/firmware design of a prototype microcontrolled Ring Interface (RI) for the proposed Naval Postgraduate School Data Communication Ring System is presented. A microcontroller and its associated assembly language, SMAL (Symbolic Microcontroller Assembly Language), are discussed and the Ring Interface Program (written in SMAL) is also included along with the respective machine code version. Finally, the expected capabilities, limitations, and tradeoffs are presented with possible long-term improvements. (Modified author abstract)

AD-783 037/5CP PC **A03**/MF **A01**
Naval Underwater Systems Center New London Conn New London Lab
Error Probability Characteristics for Uncoded F-out-of-A Communication with D-Fold Diversity
Technical rept.
Albert H. Nuttall. 24 Jun 74, 30p Rept no. NUSC-TR-4765

Descriptors: *Information theory, *Signal processing, White noise, Curve fitting, Graphics, Probability, Errors, Computer programs.
Identifiers: Data transmission, Signal detection.

The error probability characteristics for F-out-of-A communication with D-fold diversity are derived and plotted for several values of F and A and for D = 1, 2, 3, 4, 6, 8, 12, 16, 24, 32, 48, 64, in a range of character error probabilities P(e) from 0.1 to 0.00001. The optimum order of diversity for a limited total available received signal energy is found to correspond to an energy-to-noise ratio of about 5 dB per signaling element. A comparison with orthogonal multiple alternative signaling is made, and requirements on time and frequency separations and their extents are discussed. (Author)

AD-783 954/1CP PC-**GPO**/MF **A01**-NTIS
National Bureau of Standards Washington D C
Multicommodity Network Plotting via Program NETPLT
Final rept.
Zella G. Ruthberg, Gloria R. Bolotsky, and William Slater, Jr. Jun 74, 71p Rept no. NBS-TN-829
Sponsored in part by Defense Communications Engineering Center, Reston, Va. Library of Congress catalog card no. 74-600074.
Availability: Paper copy available from GPO.

Descriptors: *Communications networks, *Computer programs, *Plotting, Subroutines, FORTRAN, Computer graphics.
Identifiers: NETPLT computer program, Calcomp plotters.

In the design and operation of complex networks, it is often an advantage to obtain a visual representation that readily allows for a quick appraisal of the network's current configuration or of its changed appearance due to variations of its nodes and links. The program NETPLT enables a user to plot the two leading characteristics of any multicommodity network: (1) nodes and links and (2) the multiple source-sink structure (multicommodity property). The unique feature of NETPLT is its unambiguous planar representation of links. NETPLT uses an arc of a circle instead of the usual straight line, to represent a connector between a node pair (link). (Author)

AD-784 762/7CP PC **E04**/MF **A01**
Naval Postgraduate School Monterey Calif
Unique Words for Identification and Synchronization in TDMA Satellite Communications Systems
Master's thesis
Philip Myron Sanborn. Jun 74, 81p

Descriptors: *Satellite communications, *Word recognition, *Multiple access, Time, Digital systems, Detection, Signal processing, Correlation techniques, Synchronism, Theses, Computer programs.
Identifiers: *Time division multiple access, Binary sequences.

In a time-division multiple-access (TDMA) system, many transmitting stations time share the same RF spectrum. Individual transmissions must be identifiable to distant receiving stations and must be synchronized so that no interference overlap occurs. A unique word sequence can serve both purposes. The basic concepts of a satellite communications TDMA system are briefly reviewed, with emphasis on functional receiver requirements. A correlation detection scheme is hypothesized, from which false and miss-detection probability expressions are derived. Criteria are then established for the selection of sequences suitable for use as unique words. Representative unique words of length 15 through 20 are included, along with an explanation of the difficulties encountered in devising an efficient computer search routine. (Author)

AD-785 119/9CP PC **A05**/MF **A01**
Purdue Univ Lafayette Ind
Some New Algorithms for Deterministic and Probabilistic Communication Networks
Phase rept.
P. M. Lin, B. J. Leon, T. C. Huang, and R. Krzyzanowski. Jun 74, 92p RADC-TR-74-150
Contract F30602-72-C-0438

Descriptors: *Communications networks, *Network flows, Routing, Reliability, Mathematical models, Computer programs.
Identifiers: *Graph theory.

The objective of the effort reported herein is two-fold: to develop more efficient algorithms for communication networks and to implement the algorithms. Two problems are included: the maximum flow problem and the terminal-pair reliability problem. For the maximum flow problem, a new labeling algorithm has been proposed. A complete documentation of the computer program is included. (Author)

AD-786 134/7CP PC **A05**/MF **A01**
Bolt Beranek and Newman Inc Cambridge Mass
The Network Control Center Program
Feb 73, 90p* Rept no. Technical Information-90
Contract DAHC15-69-C-0179, F08606-73-C-0027
Supersedes Rept. no. AD-777 752.

Descriptors: *Communications networks, *Computer programming, Message processing, Data processing terminals, Statistical analysis.
Identifiers: IMP(Interface Message Processors), *Interface message processors, *ARPA computer network, *Computer networks, NCC computer program.

This report describes the Network Control Center (NCC) program used in the Advanced Research Projects Agency (ARPA) Network. The information in this report will introduce programmers to the functions and fundamental structure of the NCC program. A diagram showing the format of IMP-NCC messages has been included and other major data entities are discussed. A program listing and concordance are included as attachments and a guide to NCC operations has been appended to the report.

AD-786 135/4CP PC **A10**/MF **A01**
Bolt Beranek and Newman Inc Cambridge Mass
The Terminal Interface Message Processor Program
Aug 73, 214p* Rept no. Technical Information-91
Contract DAHC15-69-C-0179, F08606-73-C-0027
Supersedes Rept. no. AD-781 459.

Descriptors: *Communications networks, *Computer programming, Data processing terminals, Message processing, Memory devices, Control sequences.
Identifiers: IMP(Interface Message Processors), *Interface message processors, ARPA computer network, Computer networks, TIP computer program.

Contents: Overview of the Terminal IMP hardware; software summary; performance summary; summary of protocol design decisions and protocol deviations; references and TIP bibiliography; storage layout; data structures; detailed software description; TIP site configuration macros; TIP concordance; TIP listing; TIP mag tape option listing.

AD-786 371/5CP PC **A04**/MF **A01**
Naval Underwater Systems Center New London Conn New London Lab
Operating Characteristics for Detection of a Fading Signal in M Alternative Locations with D-Fold Diversity
Technical rept.
Albert H. Nuttall. 20 Aug 74, 68p Rept no. NUSC-TR-4793

Descriptors: *Information theory, *Signal processing, *Message processing, Fading(Electromagnetic waves), Probability, Errors, Signal to noise ratio, Curve fitting, Graphics, Computer programs.
Identifiers: Data transmission, Signal detection.

The probabilities of correct decision and false alarm for a fading signal in M alternative locations with D-fold diversity are derived and numerically evaluated over the range of values M = 1, 2, 4, 16, 64, 256, 1024 and D = 1, 2, 3, 4, 6, 8, 12, 16, 24, 32, 48, 64 for a wide range of signal-energy-to-noise-density-level ratios (ENR). These results which apply to the optimum receiver processor, have relevance to synchronization as well as to multiple alternative communication with thresholding. It is found that the optimum order of diversity does not correspond to the familiar 5 dB ENR per branch, but rather to ENR branch values as large as 14 dB for some cases of small false-alarm probability and moderate correct-decision probability. (Modified author abstract)

AD-786 667/6CP PC **A04**/MF **A01**
Office of Telecommunications Boulder Colo Inst for Telecommunication Sciences
Objective Measurement Techniques for Evaluating Voice Communication Channels
Final rept. on Task A
R. W. Hubbard, and W. J. Hartman. Jul 74, 73p
FAA-RD-74-77
Contract DOT-FA72WAI-326

Descriptors: Voice communications, Multichannel communications, Measurement, Speech, Quality, Indexes(Ratios), Computer programs.

The report presents methods for objectively evaluating the quality of voice communication circuits, based upon the Articulation Index (AI). The Speech Communication Index Meter (SCIM) and associated computer programs for calculating AI are discussed in some detail and procedures are presented for making system measurements. (Author)

AD-787 441/5CP PC **A05**/MF **A01**
Naval Postgraduate School Monterey Calif
Congestion in a System of N Service Centers with Interference
Master's thesis
Lee Kheng Nam. Sep 74, 85p

Descriptors: *Facsimile transmission, *Queueing theory, Stochastic processes, Partial differential equations, Computer programs, Theses.
Identifiers: Birth and death processes.

The main purpose of this thesis is to construct and compare various models which can be used to analyze the degree of congestion in a system of N sendox facsimile machines. Sendox machines can both transmit and receive (but not simultaneously) photocopies using standard telephone lines. The original problem arose out of a proposal to install a number of these machines in central London Mintech buildings for transmission of thin immediate messages between buildings. This problem was first studied by Coleman who investigated the expected system congestion, expected cost per message and a possible priority system.

AD-813 738/CP PC **A06**/MF **A01**
Philco-Ford Corp., Palo Alto, Calif. Space and Re-Entry Systems Div.
Error Rate Analysis of M-ary Transmitted Reference Systems Using the Sunds Troposcatter Model
Final technical rept. Jul 66-Feb 67
L. Schuchman, J. J. Jones, and D. T. Magill. Apr 67, 107p SRS-TM-115, RADC-TR-67-112
Contract AF 30(602)-4392
Distribution Limitation now Removed.

Descriptors: *Pulse code modulation, *Phase modulation, *Radio transmission, Pulse code modulation, Computer programs, Scattering, Troposphere, Performance(Engineering), Single sideband communication systems, Multiplex, Information theory, Radiofrequency power, Errors, Radio interference, Demodulation, Computer programs, Fourier analysis, Diversity reception, Radio transmitters, Radio receivers.
Identifiers: M-ary orthogonal modulation, M-ary differential modulation, Phase shift keying, Tropospheric scatter communication, Frequency division multiplex.

M-ary orthogonal and differentially coded transmitted-reference systems have been evaluated as to their performance in a Sunde troposcatter channel model. It has been found that the irreducible time dispersion bound decreases with M for orthogonal coding and increases with M for differentially coherent coding (M = 2, 4, and 8). The results have been compared with several other troposcatter systems that have, in the past, been evaluated using the Sunde model. The results show that several of the M-ary techniques can improve the irreducible bound by more than an order of magnitude. An illustrative design is shown in block diagram form which demonstrates a simple but efficient realization of a high data rate tropo communications system. (Author)

AD-814 488/CP PC **A12**/MF **A01**
Philco-Ford Corp., Arlington, Va. Systems Technology Center.
Optimum Allocation of Communication Satellite Resources
Final rept.
George E. Bowden, Ronald J. Jonaitis, and Gerald R. Trone. Apr 67, 270p RADC-TR-67-144
Contract AF 30(602)-4018
Distribution Limitation now Removed.

Descriptors: *Communication satellites(Active), Multiple operation, *Computer programs, Communication satellites(Active), Optimization, Numerical analysis, Partial differential equations, Queueing theory, Probability, Selection.
Identifiers: Multiple access, Allocation.

This report covers an investigation of methods for optimizing the operation of a communications network which uses a single, hard-limiting, multiple access satellite as a relay on all links, and which may use either frequency division, time division or spread spectrum multiple access techniques. Alternative methods based on dynamic programming techniques and on Lagrange multiplier analysis have been developed for each multiple access technique, and have been programmed in Fortran IV. A description and card listing of these programs is included as an appendix to the report. (Author)

AD-846 735/CP PC **A16**/MF **A01**
Bell Aerosystems Co., Tucson, Ariz. Arizona Operations.
LF/VLF Propagation Analysis Computer Program Documentation
Final rept. Jan-Oct 68
John K. Oliver, Jr, Guillermo Gonzalez, and John L. Lloyd. Dec 68, 356p RADC-TR-68-453
Contract F30602-68-C-0145
Distribution Limitation now Removed.

Descriptors: *Radio transmission, Computer programs, *Radiofrequency interference, Computer programs, Low frequency, Very low frequency, Mathematical prediction, Ionosphere, Ionospheric propagation, Subroutines, Flow charting, Programming languages, Electromagnetic wave reflections, Electromagnetic compatibility, Attenuation.
Identifiers: IPP-1 computer program.

The report describes a propagation loss model in the LF and VLF frequency range for the RADC interference prediction computer program. The RADC interference prediction program, (IPP-1) is a collection of computer routines written in fortran IV used to predict the potential interference of electronic equipment in an electromagnetic environment. The digital computer program was developed to predict the propagation losses at frequencies between 3 and 300 kHk. (author)

AD-846 957/CP PC A07/MF A01
Atlantic Research Corp., Alexandria, Va. Jansky and Bailey Engineering Dept.
Prediction Routine Studies. Volume I. Sample Problems and Frequency Band Analysis
Final rept. Mar 67-Aug 68
William C. Duff, Frank E. Ferrante, Thomas E. Baldwin, Jr, and William P. Seneker. Dec 68, 145p RADC-TR-68-345-Vol-1
Contract F30602-67-C-0244
Distribution Limitation now Removed.

Descriptors: *Radio communication systems, Electromagnetic compatibility, *Radio interference, *Computer programs, Programming(Computers), Predictions, Microwave communication systems, Single sideband communication systems, Radio transmitters, Radio receivers, Antennas, Training.
Identifiers: FORTRAN, IPP-1 computer program, FORTRAN 4 programming language.

The report presents the results of an effort devoted to updating the RADC interference prediction program (IPP-1). The work consisted of exercising the IPP-1 with various types of interference sample problems and training RADC personnel in the use of data input and computer control needed to implement the computer program. As a result of this investigation, a computer program was developed for predicting the interference between equipments where specific operating frequency assignments are not available. The program is designed to evaluate the interference conditions on the basis of a band of frequencies associated with each equipment. All of the necessary information required to operate the program, including logic flow diagrams, is presented. (Author)

AD-846 961/CP PC **A09**/MF **A01**
Atlantic Research Corp., Alexandria, Va. Jansky and Bailey Engineering Dept.
Prediction Routine Studies. Volume II. Intermodulation Analysis
Final rept. Mar 67-Aug 68
William G. Duff, Frank E. Ferrante, Thomas E. Baldwin, Jr, and William P. Seneker. Dec 68, 200p RADC-TR-68-345-Vol-2
Contract F30602-67-C-0244
See also Volume 3, AD-846 962.
Distribution Limitation now Removed.

Descriptors: *Radio communication systems, Electromagnetic compatibility, *Radio interference, *Computer programs, Frequency modulation, Predictions, Data processing systems, Mathematical models, Interference, Flow charting, Programming(Computers), Radio receivers, Subroutines.
Identifiers: Fortran, IPP-1 computer program, *IPP(Interference prediction process), *Interference prediction process.

Interference produced through the process of radio frequency intermodulation may significantly degrade the performance of communication receivers. Consequently, a comprehensive interference prediction process should include intermodulation effects. This report presents a series of computer programs which provide intermodulation prediction capability for the IPP-1 interference prediction process currently in use by the Rome Air Development Center. The major topics presented in this report deal with: (1) environmental culling techniques (2) intermodulation model development and (3) data reduction methods for providing empirical inputs. (Author)

AD-846 962/CP PC **A05**/MF **A01**
Atlantic Research Corp., Alexandria, Va. Jansky and Bailey Engineering Dept.
Prediction Route Studies. Volume III. Field Strength/Power Density Program
Final rept. Mar 67-Aug 68
William G. Duff, Frank E. Ferrante, Thomas E. Baldwin, Jr, and William P. Seneker. Dec 68, 95p RADC-TR-68-345-Vol-3
Contract F30602-67-C-0244
See also Volume 2, AD-846 961.
Distribution Limitation now Removed.

Descriptors: *Radio communication systems, Electromagnetic compatibility, *Radio interference, *Computer programs, Predictions, Programming(Computers), Radio fields, Radiofrequency power, Density, Mathematical models, Intensity, Radio transmission, Terrain, Flow charting.
Identifiers: Fortran, IPP 1 Computer program, *IPP(Interference prediction process), *Interference prediction process.

The report describes the development of a computer program used to predict power density and field strength levels generated from a given power source and antenna. The program is intended to be operated independently or in conjunction with the over-all interference prediction and analysis program developed for RADC. Included in this report is a section describing the use of the power density program. Its operational options, and its input data requirements. (Author)

AD-850 385/CP PC **A19**/MF **A01**
Atlantic Research Corp., Alexandria, Va. Jansky and Bailey Research and Engineering Dept.
Adjacent Channel Interference Analysis
Final rept. Oct 67-Oct 68
William G. Duff, Frank E. Ferrante, Harry L. III Stemple, and Roy E. Catt. Mar 69, 439p RADC-TR-68-595
Contract F30602-68-C-0061
Distribution Limitation now Removed.

Descriptors: *Radiofrequency interference, Modualtion, *Radio receivers, Radiofrequency interference, Computer programs, Mathematical models, Programming(Computers), Subroutines.
Identifiers: *Cross modulation, Intermodulation.

The results of an investigation and analysis of adjacent channel interference effects, and documentation of the programming of mathematical models which were generated to describe these effects are presented within this report. Provided with each program description is a detailed flow chart illustrating the logic employed within the computer program and a theoretical presentation defining each mathematical model. Required input data is defined and a discussion of the methods used in generating a magnetic tape data base is presented. (Author)

AD-866 966/CP PC **A05**/MF **A01**
ADCOM, Cambridge, Mass.
Wireline Simulator
Final technical rept.
Ralph W. Zaorski, Herbert G. Coles, and Roger D. Dowd. Feb 70, 96p G-118-FTR, RADC-TR-69-107
Contract F30602-68-C-0164
Distribution Limitation now Removed.

Descriptors: *Telephone communication systems, Model tests, *Simulators, Mathematical models, Data transmission systems, Voice communication systems, Analog-to-digital converters, Digital-to-analog converters, Frequency shift converters, Attenuation, Distortion, Electric filters, Magnetic core storage, Computer logic, Control sequences, Flow charting, Computer programs.
Identifiers: *Wireline simulators, Digital filters, Telephone channels, Computerized simulation.

The report discusses the design of an all digital wireline simulator which reproduces most of the impairments normally encountered on a 4 khz telephone channel. The simulator comprises a programmable digital filter, a frequency offset unit, an impulse noise generators, and interfaces with a general purpose digital computer and with input and output analog signals. The report provides a complete technical discussion of the simulator design. Also included are computer programs for controlling the response of the digital filter. (Author)

AD-908 863/4CP PC **A06**/MF **A01**
TRW Systems Group, Redondo Beach, Calif.
High Speed Electronic Bit Synchronizer
Final rept.
Ted J. Johnson, D. J. Andrew, K. Fawcett, and F. Carper. Mar 73, 119p AFAL-TR-73-12
Contract F33615-71-C-1866
Distribution Limitation now Removed.

Descriptors: *Optical communications, *Mode locked lasers, Synchronization(Electronics), Optical communications, Phase locked communications, Integrated circuits, Simulators, Strip transmission lines, Data transmission systems, Errors, Gain, Matched filters, Automatic gain control, Computer programs.
Identifiers: Jitter, Large scale integration, Sample and hold circuits.

Communications by means of mode-locked lasers requires a bit synchronizer at the receiver capable of detecting an Rz pulse stream at a data rate of 1.0 gigabit/second. A synchronizer meeting these requirements was designed, constructed, and tested. The report presents a description of the synchronizer and highlights significant advances in circuit technology that were developed. Of particular note is the discussion of the theory and design of a passive microstrip filter that performs a continuous integrate and dump operation with an Rz signal. A laser link simulator was designed and constructed, and a description of it is presented.

AD-913 995/7CP PC **E03**/MF **A01**
Computer Sciences Corp., Falls Church, Va.
Development of New Techniques for Cost-Effective Network Designs
Final rept.
R. Brautigam. Jun 73, 34p Rept no. R417602-1-1
Contract DCA100-72-C-0038
Distribution Limitation now Removed.

Descriptors: *Communication systems, *Networks, Cost effectiveness, Communication systems, Costs, Telephone communication systems, Europe, Automation, Simulators, Computer programs, Scheduling.
Identifiers: Autovon, Network analysis, SD.

The work performed for the defense communications agency on development of new techniques for cost-effective network designs is described. The work consisted of five investigations, including study and design of a European telephone system, development of an AUTOVON routing design capability, development of automated techniques for costing the AUTOVON network, Development of a methodology for AUTOVON access line engineering, and development of a computer network analysis (CNA) simulator. The effort of each of these tasks is summarized and the deliverables identified. A validation report for the CNA simulator is included.

AD-917 036/6CP PC **E09**/MF **A01**
Computer Sciences Corp., Falls Church, Va.
Busy Hour Model Program Reports
Jan 74, 269p Rept no. CAC-R4195910-2-1
Contract DCA100-73-C-0033
Distribution Limitation now Removed.

Descriptors: *Voice communications, *Computer programs, Networks, Telephone systems, Flow charting, Communication and radio systems, User needs, Handbooks, Instruction manuals, FORTRAN, Traffic, Digital computers, Punched cards, Errors, Subroutines, Files(Records).
Identifiers: *Busy hour model computer programs, FORTRAN 4 programming language, COBOL, AUTOVON, IBM 360 computers, IBM 370 computers.

The report contains detailed descriptions and flow charts of the programs that constitute the busy hour model. It is written to assist the program analyst or programmer in program maintenance and update. The model was developed for use in the design and analysis of voice networks. It is programmed in FORTRAN 4 and COBOL and designed to operate on IBM 360 and 370 computers. The model is a steady-state simulator that distributes traffic through a network and calculates grade of service from probability equations. The system is disk oriented and contains various data preparation and network simulation programs. The primary inputs to the model are card image files stored on disk that describe the network and traffic to be simulated.

AD-917 041/6CP PC **E06**/MF **A01**
Computer Sciences Corp., Falls Church, Va.
Autodin Time Sharing Editor System Program Reports
Jan 74, 134p Rept no. CSC-R4195960-2-1
Contract DCA100-73-C-0033
Distribution Limitation now Removed. See also AD-917 047.

Descriptors: *Telephone systems, *Computer programs, *AUTODIN, Computer programs, Time sharing, Computer logic, Simulators, Editing, Display systems, Files(Records), Errors, Specifications, Maintenance, Message processing, FORTRAN, Subroutines, Flow charting, Networks. FORTRAN 4 programming language, COBOL programming language, Computer software.

The AUTODIN time sharing editor (TSODIN) system is a series of computer programs developed to permit on-line modifications to input data files required by the DIN simulator. The system reduces the turn-around time required to perform autodin engineering studies using the DIN simulator. It consists of eight programs which provide the capability to add, delete or modify records and perform extensive error analysis from an IBM 3277 display station. It is written in FORTRAN 4 and

Ansi COBOL for execution on an IBM 360 or 370 computer. This manual contains detailed descriptions and flow charts of the programs that constitute the TSODIN systems. It describes the editing capabilities, operating procedures, system options, and program logic. It is written to assist the program analyst or programmer in program maintenance and update. (Author)

AD-917 046/5CP PC **A08**/MF **A01**
Computer Sciences Corp., Falls Church, Va.
Busy Hour Model User's Manual
Jan 74, 175p Rept no. R4195910-1-1
Contract DCA100-73-C-0033
Distribution Limitation now Removed.

Descriptors: *Voice communications, *Computer programs, Telephone systems, User needs, Handbooks, Digital computers, Networks, Traffic, Simulation, Fortran, Files(Records), Communication and radio systems, Instruction manuals, Flow charting, Models, Simulators, Errors, Core storage, Punched cards.
Identifiers: Autovon, IBM 360 computers, IBM 370 computers, *Busy hour model computer programs, Cobol programming language.

The busy hour model is a series of computer programs developed to simulate voice communication networks. It is particularly applicable to the autovon portion of the defense communication system (DCS). The model is a steady state simulator that distributes traffic through a network and calculates grade of service from probability equations. It is used by traffic engineers for design and performance studies of various network configurations. It is written in FORTRAN and ANSI COBOL for execution on an IBM 360 or 370 computer system having 700K or more bytes of memory. This manual contains the information necessary to use the model. It describes the input data, control cards, and program options. It contains diagrams of program execution and data flow and examples of the job control language cataloged procedures.

AD-917 047/3CP PC **E04**/MF **A01**
Computer Sciences Corp., Falls Church, Va.
Autodin Time Sharing Editor System Users Manual
Jan 74, 86p Rept no. CSC-R4195960-1-1
Contract DCA100-73-C-0033
Distribution Limitation now Removed. See also AD-917 041.

Descriptors: *Telephone systems, *Computer programs, Computer programs, Time sharing, Digital systems, Pulse communications, Simulators, Handbooks, Digital computers, Display systems, Department of Defense, User needs, Magnetic tape, Flow charting, Files(Records), Communication satellites, Real time, Editing, Keyboards, Networks, Message processing, On line systems, Specifications, Errors, FORTRAN.
Identifiers: *AUTODIN, FORTRAN 4 programming language, COBOL programming language, AUTOVON, IBM 370 computers, IBM 360 computers.

The use of the AUTODIN time sharing editor (TSODIN) system is described. The system provides the capability to perform real-time modifications to data files used by the DIN simulator to decrease the time required to perform AUTODIN engineering studies using the simulator. The system is designed to be executed from an IBM 3277 display station and includes programs to edit input files and perform error diagnostics. The edit functions include adding, replacing, modifying, and deleting records from input files. The system runs on an IBM 370/155 computer using the OS/MVT operating system with the standard IBM time sharing option (TSO). (Author)

AD-920 001/5CP PC **A05**/MF **A01**
Varian Associates Palo Alto Calif Light Sensing and Emitting Div
High Speed 1.06 Micron Photomultiplier Tubes
Final rept. 1 Jun 71-29 Jun 73
R. S. Enck, Jr. Jun 74, 94p AFAL-TR-73-401
Contract F33615-71-C-1763
Distribution limitation now removed.

Descriptors: *Infrared detectors, *Crossed field devices, *Photomultiplier tubes, Response, *Laser communications, Frequency multipliers, *Neodymium lasers, Harmonic generators, Near infrared radiation, Green, Gain, Bandwidth, Quantum efficiency, Light pulses, Yttrium aluminum garnet, Photosensitivity, Dynodes, Noise(Electrical and electromagnetic), Digital computers, Computer programs, Transients, Indium phosphides, Arsenides, Gallium arsenides, Bibliographies.
Identifiers: Transient response, S-20 photocathodes, Rise time, Fall time, Indium arsenide phosphides, Group 3 elements, Group 5 elements, Negative electron affinity, Computer aided design.

This report describes the results of work performed under this contract the original purpose of which was to design and develop high speed 1.06 micron sensitive static crossed field photomultipliers. As a result of two program modifications, this contract successfully developed two different static crossed field photomultipliers (SCFPs). The end use of such devices would be their incorporation into gigabit laser communication systems as optical receivers. The first development of this three-phase program was a high output current (250 microamp) four-stage device which features 120 picosecond rise and fall times, a 3-gigahertz bandwidth, 1000 gain, and either S-20 or 1.06 micron InAsP photocathodes achieving 7% quantum efficiency at 5000A and 1.4% quantum efficiency at 1.06 microns. The second development was a 250 microamp output current, six-stage SCFP achieving 100,000 gain at 150 picosecond rise and fall times (2.5 GHz bandwidth) and incorporated GaAs 0.53 micron photocathodes which achieved 18% quantum efficiency. Excess noise for these devices was less than 1 dB. Finally, 0.53 micron GaAs photocathodes were incorporated into 250 microamp output current four-stage devices with the same gain and bandwidth as achieved in the first development. Quantum efficiencies of 22% at 0.53 micron were produced as well as high gain gallium phosphide dynodes and excess noise of less than 0.4 dB.

AD-923 122/6CP PC **A06**/MF **A01**
Naval Electronics Lab. Center, Dan Diego, Calif.
Energy Use for the Autoregressive Channel with Noiseless Feedback: Numerican Study
Technical document 1 Jul 72-1 Jul 73
J. C. Tiernan, and K. Kaufmann. Jul 74, 109p
Rept no. NELC-TD-355
Distribution Limitation now Removed.

Descriptors: *Data transmission systems, *Digital computers, *Multichannel communications, Information theory, Algorithms, Feedback, Telecommunication circuits, Regression analysis, Nonlinear programming, Low noise, Energy, Gaussian noise, Kalman filtering, Computer programs, Iterations, Numerical analysis.
Identifiers: *Channel communications, *Communication theory, *Feedback communications, Autoregression, Energy distribution, IBM 360 computers, Noiseless feedback.

Energy distribution, giving greatest rate performance, has been numerically determined for the first-order autoregressive channel noiseless feedback when a center-of-gravity processor is used. Determination was made during investigation on communication systems with potential Navy application. A powerful nonlinear programming computer program, using a new algorithm, has been developed to solve constrained nonlinear problems.

COM-72-11297/CP PC **A05**/MF **A01**
Office of Telecommunications, Boulder, Colo. Inst. for Telecommunication Sciences.
A User's Guide to Path Loss Computations
Technical memo.
G. Hufford. Sep 72, 99p Rept no. OT/ITSTM-104

Descriptors: *Radio transmission, Transmission loss, *Computer programming, Programming manuals, FORTRAN, Very high frequencies, Ultrahigh frequencies, Superhigh frequencies.
Identifiers: LOSS computer program, FORTRAN 4 programming language, CDC 3000 computers, CDC 6000 computers.

Program LOSS was designed to compute estimated statistics of the path loss between two radio antennas operating at frequencies between 20 MHz and 20 GHz. It was written specifically for the CDC 3000 and 6000 series of computers. This 'User's Guide' provides: (1) Definitions and descriptions of input parameters and output values. (2) A description of the input format and the minimal data required. (3) A description of various output choices and how to instruct the program to produce them. (4) An explanation of all imput parameters one might want to specify for an 'area prediction.' (5) An explanation of the additional parameters useful in a 'point-to-point' situation. There are also five appendices in which are given a summary of the input parameters, examples of input data and the resulting output, and description of some of the theory behind the program and how the program operates. (Author)

COM-74-10409/2CP PC **E05**/MF **A01**
Office of Telecommunications, Boulder, Colo. Inst. for Telecommunication Sciences.
Space/Terrestrial Radio Service Coordination Areas: Program WARC 71.A28 User's Manual
T. A. Harr, Jr, K. E. Bechard, and J. J. Stephenson. May 73, 92p Rept no. OTM-73-139

Descriptors: *Space communication, *Computer programs, Time sharing, Compilers, Telecommunication, Programming manuals, FORTRAN.
Identifiers: FORTRAN 5 programming language, UNIVAC 1108 computers, WARC computer program, OTEL.

The manual describes a computer program ('WARC 71.A28') that implements the procedure (outlined in Appendix 28 of the World Administrative Radio Conference for Space Telecommunication, Geneva 1971) for determining the co-ordination area around an Earth Station in frequency bands between 1 and 40 GHz shared by Space and Terrestrial Radio Communication Services. This program is written for use on the OEP/UNIVAC-1108 computer in UNIVAC FORTRAN 5 language, but can easily be converted for use on any computer. The manual explains how to access the computer program, how to run the computer program, how th change the input values for subsequent runs of the computer program, and how to interpret the results. (Author)

COM-74-10517/2CP PC **A06**/MF **A01**
Research Triangle Inst., Durham, N.C.
Simulation Studies for NOAA Stabilized Compensation Program
Final rept. 21 Apr 72-20 May 73
W. Howard Ruedger, G. S. Brown, and J. H. White. Aug 73, 112p NOAA-74020724
Contract NOAA-2-35369

Descriptors: *Telemetry, *Scientific satellites, *Computerized simulation, Radiometers, Telemetering data, Computer programs, FORTRAN.
Identifiers: FORTRAN 4 programming language, IBM 370/65 computers, NOAA.

Long-term observation of the quality of the data from the scanning radiometer systems aboard the ITOS type spacecraft has indicated that a requirement exists for a systematic means of maintaining data quality. Previous studies have further indicated that the alignment of the equipment used to compensate for spacecraft tape recorder flutter effects was particularly sensitive in affecting data quality. This equipment was selected as the subject of a pilot program to assure data quality by stabilized control. RTI has contributed to the overall objective of this pilot program by conducting analyses of the z-axis compensation technique as it interacts with the data and by recommending diagnostic logic to survey data quality as the data are ingested from the Command and Data Acquisition Station (CDA). (Modified author abstract)

COM-74-10752/5CP PC **A04**/MF **A01**
Office of Telecommunications, Boulder, Colo. Inst. for Telecommunication Sciences.
Calculations of Interference Potential Between Geostationary Satellite Networks: Program WARC 71.A29 User's Manual
Technical memo.

T. A. Harr, Jr, and W. M. Roberts. Mar 74, 61p Rept no. OTM-74-161

Descriptors: *Space communication, *Communication satellites, *Telecommunication, *Radiofrequency interference, Computer programs, Programming manuals.
Identifiers: OTEL.

The user's manual contains a program description of what the 'WARC 71:A29' does, a sample calculation, explanations, and instructions for use of the program. Guidance is provided as to the various sources of information needed to operate the program and as to the applicability and limitations of the various classes of data. Procedures applicable in the early analysis and coordination of new foreign and domestic space systems are outlined and flow diagrams are furnished as guidance to potential users of the program. (Author)

COM-74-50634/6CP PC-GPO/MF **A01**-NTIS
National Bureau of Standards, Washington, D.C. Systems and Software Div.
Multicommodity Network Plotting via Program NETPLT
Final technical note
Zella G. Ruthberg, Gloria R. Bolotsky, and William Slater, Jr. Jun 74, 70p Rept no. NBS-TN-829
Sponsored in part by Defense Communications Agency, Arlington. Va. Library of Congress Catalog Card No. 74-600074.
Paper copy available from GPO $1.10 as C13.46:829.

Descriptors: *Telecommunication, *Network analysis theory, *Computer programs, Network flows, Graphic methods, FORTRAN, Algorithms.
Identifiers: NETPLT computer program, AUTOVON, *Communications networks, FORTRAN 4 programming language.

In the design and operation of complex networks, it is often an advantage to obtain a visual representation that readily allows for a quick appraisal of the network's current configuration or of its changed appearance due to variations of its nodes and links. The program NETPLT enables a user to plot the two leading characteristics of any multicommodity network: (1) nodes and links and (2) the multiple source-sink structure (multi-commodity property). The unique feature of NETPLT is its unambiguous planar representation of links. NETPLT uses an arc of a circle instead of the usual straight line, to represent a connector between a node pair (link).

COM-75-10266/5CP PC E03/MF **A01**
New Mexico State Univ., University Park. Dept. of Electrical and Computer Engineering.
UHF Multipath Phenomena in a Marine Environment
Keith R. Carver. Dec 74, 165 NOAA-75021201
Grant NOAA-04-4-158-41

Descriptors: *Multipath transmission, Fading, Ultrahigh frequencies, Remote sensing, Marine atmospheres, Computerized simulation, Computer programs, Antennas, Scientific satellites, Data links, FORTRAN.
Identifiers: GOES-1 satellite, FORTRAN 4 programming language, SCTTR computer program.

This report develops a model which predicts surface multipath signal variability (fading) in a marine environment which is applied to the UHF link between the buoy or ship and GOES. In addition to the theoretical multipath model, experimentally measured results are reported which confirm the prediction of the model that both fading range and median power level should be hight dependent, critically so for low elevation angles. Height-gain data were measured using improvised means and only over the 3.5 ft.-14ft. MSL range, but seemingly indicate that the received power varied twice as rapidly with height as expected. Also, this report contains antenna design information tailored to the buoy situation and the discussion of linear array theory contains previously unreported information on the directivity and beamwidth of arrays. Experimentally observed data confirm the dependence of both fading range and median power level on antenna height.

COM-75-10792/0CP PC **A06**/MF **A01**
Office of Telecommunications, Boulder, Colo. Inst. for Telecommunication Sciences.
Feasibility Model Development of the 61-kHz Subsystem of the Decision Information Distribution System
Hiroshi Akima, R. Marshall Coon, and Thijs de Haas. Nov 74, 119p Rept no. OTR-74-52
Sponsored in part by Defense Civil Preparedness Agency, Washington, D.C. Paper copy also available from GPO.

Descriptors: *Civil defense, *Radio communication systems, Warning systems, Feasibility, Coding, Frequency shift keying, Low frequency, Computerized simulation, Computer programs.
Identifiers: DIDS(Decision Information Distribution System), Decision information distribution system.

Design procedures for the 61-kHz subsystem of the Decision Information Distribution System (DIDS) are discussed, and a feasibility model developed for the subsystem is described. This subsystem is a binary, noncoherent frequency-shift-keying (NCFSK), multiple-message, one-shot, radio transmission system; in this system the receiver requires no prior knowledge of the starting time of transmission, and each transmitted signal has a common preamble for message acquisition and synchronization purposes. Design procedures are described for given probabilities of a false alarm, a premature response, a miss, and a message error. It is shown that the selection of preamble codes from random binary sequences can be a highly attractive approach. A simple, but meaningful, criterion is suggested for aid in such a selection. Comparison of the test results with theoretical prediction of the performance indicates a good agreement.

COM-75-10795/3CP PC **A06**/MF **A01**
Office of Telecommunications, Boulder, Colo. Inst. for Telecommunication Sciences.
Modeling the Service Quality of Consolidated Coast Guard 500 kHz Operations
Douglas W. Vandermade. Apr 75, 101p Rept no. OTR-75-61
Sponsored in part by Coast Guard, Washington, D.C. Paper copy also available from GPO.

Descriptors: *Radio communication, Coast Guard, Distress signals, Radio operators, Telecommunication, Performance evaluation, Transportation, Safety, Traffic, Computerized simulation, Computer programs, FORTRAN.
Identifiers: *Communications traffic.

A study was made of the U.S. Coast Guard's 500 kHz radio distress watch on the West Coast to determine if consolidation of the operation would produce unacceptable delays in service. The problem was recognized as a single server queueing system. Discussion of the general principles of queueing theory along with its application to the specific problem is provided. A FORTRAN program was developed to handle a range of single server queueing problems. The computer program was used to stimulate the 500 kHz radio watch operation and to make predictions about the service quality when several stations are consolidated. Positive recommendations based on the output are provided.

COM-75-10813/4CP PC **A06**/MF **A01**
Office of Telecommunications, Boulder, Colo. Inst. for Telecommunication Sciences.
The Numerical Representation of the Critical Frequency of the F1 Region of the Ionosphere
Rayner K. Rosich, and William B. Jones. Oct 73, 103p Rept no. OTR-73-22
Sponsored in part by Voice of America, Washington, D.C.

Descriptors: *Ionospheric propagation, *F 1 region, *Critical frequencies, Computerized simulation, Computer programs, FORTRAN.

A numerical representation of the monthly median F1-layer critical frequency foF1 is given for the worldwide geographic and diurnal variation, as well as for the periodic seasonal variation and the secular trend due to solar activity. A companion numerical representation of the maximum solar zenith angle (at ground level), chi max, for the presence of the F1 layer is also given. These maps are based upon analysis of about 40,000 data values from a worldwide network of ionospheric stations for the period January 1954 to December 1966. The expression for foF1 is a function of solar zenity angle (at ground level) chi max, the Zurich 12-month running average sunspot number R, and the seasonal components which are periodic in the month number M. This expression is a sum of 36 terms, each composed of a numerical coefficient multiplied by an elementary function of chi, R, and M. A similar expression for chi max has 22 terms and is a function of the modified (Rawer) magnetic dip eta R, and M.

COM-75-11141/9CP PC **A04**/MF **A01**
Houston Univ., Tex.
The Economic Comparison of One-Way Paging and Full Two-Way Radio Service
Howard A. Plotkin. 4 Apr 75, 58p

Descriptors: *Radio communication, Signal devices, Utilization, Economic analysis, Mathematical models, Computer programs.
Identifiers: *Radio paging systems.

The study provides an in-depth look at the way in which two-way radio and one-way paging are used in many types of operations. Mathematical models are used to describe such utilization and to measure the economic benefits to the organization.

LA-UR-74-509 PC **A03**/MF **A01**
Los Alamos Scientific Lab., N.Mex. (Usa).
Applications of Computer-Generated Perspective Plots.
M. L. Prueitt. 27p Rept no. CONF-740512-2

Descriptors: *Computers, *Plotters, *Computer codes, *P codes, Chemistry, Communications, Diagrams, Errors, Explosions, Geology, Geometry, Magnetic fields, Maps, Mathematics, Personnel, Photons, Shock waves, Topography.

For abstract, see NSA 29 12, number 31605.

LA-5896 PC **A02**/MF **A01**
Los Alamos Scientific Lab., N.Mex.
Noise Immunity in Digital Communication by Use of Orthogonal Signal Correlation and Walsh Functions.
H. F. Vogel. Apr 75, 10p
Contract W-7405-eng-36

Descriptors: *Computer codes, *W codes, *Digital systems, *Noise, Algorithms, Communications, Data transmission, Disturbances, Equations, Fourier analysis, Functions, Pulses, Radio noise, Signals.
Identifiers: ERDA/990200.

For abstract, see ERA 75 04, number 00677.

N70-27491/CP HC A03 MF **A01**
Koln Univ. (West Germany). Inst. Fuer Geophysik Und Meteorologie.
A Computer Program for Evaluating Radio Signal Propagation from Artificial Earth Satellites.
Ein Rechenprogramm Zur Bestimmung Der Ausbreitung Von Radiosignalen Kuenstlicher Erdsatelliten
G. Herrmann. Jan 70, 39p Rept no. BMBW-FB-W-70-04
Lang- in German, English Summary Spon- Sponsored By Bundesmin. Fuer Bildung Und Wiss.

Descriptors: *Artificial satellites, *Computer programs, *Optical tracking, *Radio signals, *Radio wave refraction, Geomagnetism, Ionospheric propagation, Light scattering, Wave propagation.

For abstract, see STAR 0813

COMMUNICATIONS

N70-32456/CP HC A03
Martin Marietta Corp., Denver, Colo. Electronics Research Dept.
Formulation of a Telemetry Computer Program Final Report.
K. H. Hill, and R. O. Leighou. Feb 70, 41p Rept nos. NASA-CR-102676, MCR-70-38
Contract NAS8-24017

Descriptors: *Computer programs, *Telemetry, Algorithms, Flow charts, Fortran, Input/output routines.

For abstract, see STAR 0817

N71-21465/CP PC **A07** MF **A01**
Martin Marietta Corp., Denver, Colo.
Study of Potential Applications of Digital Techniques to the APOLLO Unified S-Band Communications System, Phase 2 Final Report
Nov 70, 132p Rept nos. NASA-CR-114921, MCR-70-419
Contract NAS9-9852

Descriptors: *Apollo project, *Error detection codes, *Space communication, Algorithms, Computer programs, Digital techniques, Information theory.
Identifiers: NASA subject code 07.

For abstract, see STAR 0910

N71-25922/CP PC **A10** MF **A01**
Mcdonnell-douglas Astronautics Co., Huntington Beach, Calif.
Astronaut/Computer Communication Study Final Report
Mar 71, 218p Rept nos. NASA-CR-103171, MDC-G0985
Contract NAS8-25701

Descriptors: *Airborne/spaceborne computers, *Communicating, *Computer graphics, *Display devices, *Man machine systems, *Spacecrews, Computer programs, Data management, Flight control, Space shuttles, Words (language).

For abstract, see STAR 0914

N71-26419/CP PC **A06** MF **A01**
Alabama Univ., University. Bureau of Engineering Research.
Study of Atmospheric Effects on Laser Communications Systems. Volume 2 - Atmospheric Effects on Wave Propagation at 10.6 Microns Interim Report
K. H. George, and W. E. Webb. Mar 71, 107p Rept nos. NASA-CR-103113, BER-130-70-VOL-2
Contract NAS8-25562

Descriptors: *Atmospheric turbulence, *Gas lasers, *Heterodyning, *Optical communication, *Scintillation, *Signal to noise ratios, Apertures, Atmospheric models, Computer programs, Data reduction.

For abstract, see STAR 0914

N71-26533/CP PC **A04**
Forsvarets Forskningsanstalt, Stockholm (Sweden). Avdelning 3.
Equipment for Experimental Study of Communication Via Meteor Track
Utrustning Foer Experimentellt Stadium Av Meteorsparfoerbindelse
K. Gunmar, and B. Johansson. Nov 69, 51p Rept no. FOA-3-C-3597-63
Lang- in Swedish

Descriptors: *Communication equipment, *Data processing, *Meteor trails, *Radio communication, Computer programs, Information systems.

For abstract, see STAR 0914

N71-28162/CP PC **A14** MF **A01**
Hughes Aircraft Co., Culver City, Calif. Aerospace Group.
Study and Development of a Mathematical Analysis for the Performance Assessment of Space Communication System Parameters Final Report
K. L. Brinkman, W. K. Pratt, L. S. Stokes, and J. W. Weber. May 69, 311p Rept nos. NASA-CR-119003, P68-267
Contract NAS12-566

Descriptors: *Computer programs, *Manuals, *Performance tests, *Space communication, Cdc computers, Conversion tables, Discrete functions, Optical communication, Planetary atmospheres, Pulse position modulation, Radio transmission, Transmission loss.

For abstract, see STAR 0916

N71-33163/CP PC **A10** MF **A01**
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
The Deep Space Network, Volume 4 Progress Report, May - Jun. 1971
15 Aug 71, 223p Rept nos. NASA-CR-121378, JPL-TR-32-1526
Contract NAS7-100

Descriptors: *Data systems, *Deep space network, *Mars 71 project, *Pioneer space probes, *Radio telemetry, *Viking lander spacecraft, Computer programs, Doppler radar, Mathematical models, Noise temperature, Television systems.

For abstract, see STAR 0920

N72-17111/CP PC **A12**/MF **A01**
Computer Sciences Corp., Falls Church, Va.
Satellite Broadcasting System Study
Final Report
Jan 72, 269p Rept nos. NASA-CR-122340, REPT-4124-011
Contract NAS5-21588

Descriptors: *Broadcasting, *Communication satellites, *Computer programs, Cost analysis, Flow charts, Management planning, Tradeoffs.

The study to develop a system model and computer program representative of broadcasting satellite systems employing community-type receiving terminals is reported. The program provides a user-oriented tool for evaluating performancecost tradeoffs, synthesizing minimum cost systems for a given set of system requirements, and performing sensitivity analyses to identify critical parameters and technology. The performance costing philosophy and what is meant by a minimum cost system is shown graphically. Topics discussed include: main line control program, ground segment model, space segment model, cost models and launch vehicle selection. Several examples of minimum cost systems resulting from the computer program are presented. A listing of the computer program is also included. (Author)

N72-18159/CP PC **A03**/MF **A01**
Bellcomm, Inc., Washington, D.C.
A Model for Calculating Expected Performance of the APOLLO Unified S-Band (Usb) Communication System
N. W. Schroeder. 30 Dec 71, 50p Rept nos. NASA-CR-125670, TM-71-2034-3
Contract NASW-417

Descriptors: *Apollo project, *Performance prediction, *Radio communication, *Space communication, *Unified s band, Computer programs, Mathematical models, Numerical analysis.

A model for calculating the expected performance of the Apollo unified S-band (USB) communication system is presented. The general organization of the Apollo USB is described. The mathematical model is reviewed and the computer program for implementation of the calculations is included. (Author)

N72-18864/CP PC **A04**/MF **A01**
General Dynamics/Convair, San Diego, Calif. Advanced Space Systems.
Information Transfer Satellite Concept Study. Volume 4 Computer Manual
Final Report
P. Bergin, C. Kincade, D. Kurpiewski, F. Leinhaupel, and F. Millican. 15 May 71, 61p Rept nos. NASA-CR-114314, GDC-DCF70-003-VOL-4
Contract NAS2-5571

Descriptors: *Communication satellites, *Computer programs, *Manuals, *Mathematical models, *Telecommunication, Algorithms, Computer techniques, Information systems, Spacecraft communication.

The Satellite Telecommunications Analysis and Modeling Program (STAMP) attempts to simulate the treatment effects. An provides the user with a flexible and comprehensive tool for the analysis of ITS system requirements. While obtaining minimum cost design points, the program enables the user to perform studies over a wide range of user requirements and parametric demands. The program utilizes a total system approach wherein the ground uplink and downlink, the spacecraft, and the launch vehicle are simultaneously synthesized. A steepest descent algorithm is employed to determine the minimum total system cost design subject to the fixed user require 90 foi MF ments and imposed constraints. In the process of converging to the solution, the pertinent subsystem tradeoffs are resolved. This report documents STAMP through a technical analysis and a description of the principal techniques employed in the program. (Author)

N72-22313/CP PC **A08**/MF **A01**
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
The Deep Space Network, Volume 8
Progress Report, Jan. - Feb. 1972
15 Apr 72, 152p Rept nos. NASA-CR-126141, JPL-TR-32-1526-VOL-8
Contract NAS7-100

Descriptors: *Deep space instrumentation facility, *Deep space network, *Systems engineering, Computer programs, Parabolic antennas, Radio interferometers, Superhigh frequencies, Telecommunication, Ultrahigh frequencies.

Progress is reported on DSN supporting research and technology, advanced development and engineering, implementation, and operations which pertain to mission-independent or multiple-mission development as well as to support of flight projects. (Author)

N72-25755/CP PC **A10**/MF **A01**
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
Significant Accomplishments in Technology, Goddard Space Flight Center, 1970
J. M. Bridger. 1972, 214p Rept no. NASA-SP-295
Conf- Symp. Held At Greenbelt, Md., 13 Jan. 1971

Descriptors: *Conferences, *Orbit calculation, *Satellite antennas, *Satellite attitude control, *Satellite-borne instruments, *Spacecraft communication, *Technology assessment, Antenna arrays, Computer programs, Electric power supplies, Ground support systems, Prediction analysis techniques, Radiation effects, Satellite transmission, Spacecraft tracking.

For abstract, see STAR 1016

N72-26118/CP PC **A03**/MF **A01**
Maryland Univ., College Park. Dept. of Physics and Astronomy.
The Genrel Teletype Package
B. K. Reid. May 71, 45p Rept nos. NASA-CR-127055, TR-71-108
Contract NAS9-5886

Descriptors: *Computer programs, *Teletypewriter systems, *Time sharing, Conversation, Fortran, Input/output routines, Words (language).

A collection is presented of programs designed specifically for use on a teletype (or similar conversational time-sharing terminal). The criteria for designing these programs are given, and a description of each program is included.

COMMUNICATIONS

N72-28232/CP PC **A03**/MF **A01**
General Electric Co., Syracuse, N.Y. Electronics Lab.
Electronic Scene Generator Expansion System
Final Report
W. H. Sharp. Dec 71, 26p Rept no. NASA-CR-115743
Contract NAS9-11065

Descriptors: *Computerized simulation, *Electronic equipment, *Generators, Aerospace environments, Computer programs, Systems engineering.

The design, fabrication, and installation of additions and modifications to the electronic scene generator located at the NASA Manned Spacecraft Center, Houston, Texas, are described. The equipment delivered was incorporated into the electronic scene generator to enhance its capabilities by providing: (1) additional source computer interfaces; (2) additional edges thereby allowing more detailed scenes; (3) the ability to share edges to effect economies in complex scenes; (4) the ability to use edges without the constraints of a configuration catalog; and (5) the simplified implementation of new environments and environment modifications. (Author)

N72-30148/CP PC **E06**/MF **A01**
Systems Associates, Inc., Long Beach, Calif.
Advanced Communication System Time Domain Modeling Techniques Asystd Software Description. Volume 1 Program Users Guide
Aug 72, 168p Rept nos. NASA-CR-128516, R72-001-VOL-1
Contract NAS9-11743

Descriptors: *Computerized simulation, *Manuals, *Telecommunication, Computer programs, Fortran, Time dependence.

A computer program is described which is primarily designed to simulate the transient behavior of communications systems. (Author)

N72-30149/CP PC **E03**/MF **A01**
Systems Associates, Inc., Long Beach, Calif.
Advanced Communication System Time Domain Modeling Techniques Asystd Software Description. Volume 2 Program Support Documentation
Aug 72, 70p Rept nos. NASA-CR-128517, R72-001-VOL-2
Contract NAS9-11743

Descriptors: *Computerized simulation, *Documentation, *Telecommunication, Computer programs, Fortran, Mathematical models, Time dependence.

For abstract, see STAR 1021

N72-31176/CP PC **E04**/MF **A01**
Auburn Univ., Ala. Engineering Experiment Station.
Television Broadcast Satellite Systems, Volume 1
Final Report
E. R. Graf. 1972, 88p Rept no. NASA-CR-123818
Contract NAS8-24818

Descriptors: *Communication satellites, *Computer programs, *Television systems, Radio frequencies, Wave propagation.

Empirical expressions are derived to account for various components of the television satellite broadcast system. Computer programs are developed to determine the system weight in any general design. The factors of picture quality, propagation losses, and RF power requirements are discussed and determined. (Author)

N73-11131/CP PC **A03**/MF **A01**
Research Inst. of National Defence, Stockholm (Sweden).
The Influence of the Lower Ionosphere on Wave Propagation in the LF Range Up to a Distance of 300 Km
L. Ladell. Apr 71, 47p Rept nos. FOA-3-C-3673-60, REPT-18

Descriptors: *Ionospheric disturbances, *Ionospheric propagation, *Low frequencies, *Radio waves, Computer programs, Hyperbolic navigation, Numerical analysis.

Calculations of the electric field strength of ionospheric waves are presented, assuming realistic ionospheric models. The earth magnetic field is neglected and the ionosphere is considered to be horizontally stratified. The calculations are made by a multislab approximation method, using a computer. It is determined that of the three different ionospheric profiles considered, only the night profile gives a seriously distrubing ionospheric wave. (Author)

N73-16125/CP PC **A02**/MF **A01**
Kentucky Univ., Louisville. Dept. of Electrical Engineering.
Development of Communications Analysis Techniques
Final Report
R. D. Shelton. 30 Sep 72, 9p Rept nos. NASA-CR-130272, TR-EE-72-102
Contract NGR-18-002-026

Descriptors: *Computer programs, *Frequency modulation, *Linear systems, *Systems analysis, *Systems engineering, Communication equipment, Differential equations, Performance, Signal distortion.
Identifiers: NASA.

Major results from the frequency analysis of system program (FASP) are reported. The FASP procedure was designed to analyze or design linear dynamic systems, but can be used to solve any problem that can be described by a system of linear time invariant differential equations. The program also shows plots of performance changes as design parameters are adjusted. Experimental results on narrowband FM distortion are also reported.

N73-26145/5CP PC **E03**/MF **A01**
TRW Systems Group, Redondo Beach, Calif.
Spectral Analysis Program. Volume 1: User'S Guide
W. L. Hayden. 12 Jun 72, 68p Rept nos. NASA-CR-128984, TRW-20817-H010-R0-00-VOL-1
Contract NAS9-11977

Descriptors: *Carrier waves, *Computer programs, *Power spectra, *Spectrum analysis, Digital computers, Fourier transformation, Frequency modulation, High frequencies.
Identifiers: NASA.

The spectral analysis program (SAP) was developed to provide the Manned Spacecraft Center with the capability of computing the power spectrum of a phase or frequency modulated high frequency carrier wave. Previous power spectrum computational techniques were restricted to relatively simple modulating signals because of excessive computational time, even on a high speed digital computer. The present technique uses the recently developed extended fast Fourier transform and represents a generalized approach for simple and complex modulating signals. The present technique is especially convenient for implementation of a variety of low-pass filters for the modulating signal and bandpass filters for the modulated signal. (Author)

N73-26146/3CP PC **E06**/MF **A01**
TRW Systems Group, Redondo Beach, Calif.
Spectral Analysis Program (Sap). Volume 2: Programmer'S Manual
G. L. Houser, and R. C. Thomas. 16 Jun 72, 160p Rept nos. NASA-CR-128985, TRW-20817-H011-R0-00-VOL-2
Contract NAS9-11977

Descriptors: *Computer programs, *Flow charts, *Lists, *Manuals, Plotting, Spectrum analysis, Telecommunication.
Identifiers: NASA.

The spectral analysis program (SAP) flow diagrams, and listings are presented. The plot generation program (PLTGEN) flow diagrams and listings are also included. (Author)

N73-31402/3CP PC **A03**/MF **A01**
Australian Post Office Research Labs., Melbourne.
Automatic Speech Level Meter
G. T. Martin. Sep 72, 31p Rept no. REPT-6648

Descriptors: *Circuits, *Recording instruments, *Speech recognition, Audio frequencies, Computer programs, Voltmeters.
Identifiers: NASA.

A description is given of the design and operation of the automatic speech level meter. A brief summary is presented of computer programs available to process the output tape and operating instructions for running the programs are also given. The instrument is designed to measure signal levels on a voice frequency telephone circuit by sampling the instantaneous signal voltage approximately four times per second, then logarithmically quantising and coding the sampled value and recording it on punched paper tape. The paper tape is computer processed to produce results which statistically characterise the signal amplitude distribution. A control unit allows the speech level meter to automatically operate when a telephone call is established, and measure speech flowing in one direction only on a two-wire circuit. (Author)

N73-33108/4CP PC **A02**/MF **A01**
Australian Post Office Research Labs., Melbourne.
A Set of Satellite Link Calculation Programs
M. Balderston, and V. Laats. May 73, 21p Rept no. REPT-6806

Descriptors: *Computer programming, *Data links, *Spacecraft communication, Computer programs, Flow charts, Radio frequencies.
Identifiers: NASA.

Seven computer programs for analyzing satellite communication links have been written. The programs will run on any computer which provides a BASIC compiler. The equations used, sample runs, flow charts and complete listings are shown. The calculations provide for analysis of the RF links, antenna parameters, receiver parameters, and FM and PCM RF-to-baseband systems. (Author)

N74-16885/7CP PC **E08**/MF **A01**
Computer Sciences Corp., Falls Church, Va.
Frequency Modulation Television Analysis: Threshold Impulse Analysis
Final Report, Sep. 1972 - Nov. 1973.
W. H. Hodge. 26 Nov 73, 239p Rept nos. NASA-CR-132906, REPT-3007-1
Contract NAS5-21872

Descriptors: *Computer programs, *Frequency modulation, *Television transmission, Impulses, Probability density functions, Rates (Per time), Signal to noise ratios, Thresholds.
Identifiers: NASA.

A computer program is developed to calculate the FM threshold impulse rates as a function of the carrier-to-noise ratio for a specified FM system. The system parameters and a vector of 1024 integers, representing the probability density of the modulating voltage, are required as input parameters. The computer program is utilized to calculate threshold impulse rates for twenty-four sets of measured probability data supplied by NASA and for sinusoidal and Gaussian modulating waveforms. As a result of the analysis several conclusions are drawn: (1) The use of preemphasis in an FM television system improves the threshold by reducing the impulse rate. (2) Sinusoidal modulation produces a total impulse rate which is a practical upper bound for the impulse rates of TV signals providing the same peak deviations. (3) As the moment of the FM spectrum about the center frequency of the predetection filter increases, the impulse rate tends to increase. (4) A spectrum having an expected frequency above (below) the center frequency of the predetection filter produces a higher negative (positive) than positive (negative) impulse rate. (Author)

N74-19103/2CP PC **A02**/MF **A01**
Kiruna Geophysical Observatory (Sweden).
Vlf Receiver Calibration.
S. Westerlund. Sep 73, 25p Rept no. KGO-73-3

Descriptors: *Calibrating, *Frequency synthesizers, *Receivers, *Very low frequencies, Amplifiers, Computer programs, Equivalent circuits, Frequency analyzers, Loop antennas, Magnetic fields, Magnetic measurement.
Identifiers: NASA.

One loop is used for creating a known field at the position of another loop. Theoretical principles, including axial magnetic field from a magnetic dipole in the form of a loop and the equivalent circuit diagram of a loop, are outlined. The calibration setup and some computer programs to simplify calibration are presented. The results of calibration are shown and instructions for conversion of paper chart readings to field strength are illustrated with an example.

N74-31620/9CP PC **A03**/MF **A01**
Japan Broadcasting Corp., Tokyo. Technical Research Labs.
Computer-Aided Design in Television Circuits.
K. Wakui, T. Kawashima, A. Wakabayashi, and T. Mochizuki. Nov 73, 32p Rept no. NHK-TECH-MONO-22

Descriptors: *Computer programs, *Computerized design, *Electronic equipment, *Television systems, Circuit diagrams, Equipment specifications, Systems engineering.

The research and development activities on computer aided design of television circuits are discussed. In the area of program application, the design review of a compact standard color television camera was carried out by use of computer programs, resulting in improved performance, stability, and reliability. Details of the computer programs are described and examples of the circuits are diagrammed. (Author)

N75-19481/1CP PC **A10**/MF **A01**
Harris Corp., Melbourne, Fla. Electronic Systems Div.
Performance Analysis of Wideband Data and Television Channels.
Final Report, Feb. 1974 - Jan. 1975.
J. M. Geist. 31 Jan 75, 211p Rept nos. NASA-CR-141708, REPT-9300-75-001
Contract NAS9-13859

Descriptors: *Space shuttles, *Spacecraft communication, *Television transmission, *Wideband communication, Computer programs, Computerized simulation, Performance prediction, Phase shift, Tdr satellites.

Several aspects are discussed of space shuttle communications, including the return link (shuttle-to-ground) relayed through a satellite repeater (TDRS). The repeater exhibits nonlinear amplification and an amplitude-dependent phase shift. Models were developed for various link configurations, and computer simulation programs based on these models are described. Certain analytical results on system performance were also obtained. For the system parameters assumed, the results indicate approximately 1 db degradation relative to a link employing a linear repeater. While this degradation is dependent upon the repeater, filter bandwidths, and modulation parameters used, the programs can accommodate changes to any of these quantities. Thus the programs can be applied to determine the performance with any given set of parameters, or used as an aid in link design. (Author)

N75-29301/9CP PC **A02**/MF **A01**
Signals Research and Development Establishment, Christchurch (England).
Gospre: A Simple Analytical Program for Computing Grade of Service in a Heavily Loaded Communications Network.
F. B. Johnson. Aug 74, 21p Rept nos. SRDE-74018, BR44152

Descriptors: *Air traffic control, *Aircraft communication, *Computer programs, *Networks, Analytic functions, Simulation.

A simple analytical procedure was devised, together with a computer program for applying it, whereby system average quantities such as Grade of Service are predicted for a communications network operating under conditions where relatively heavy traffic makes source and sink blocking a more significant cause of call attempt failure than is blockage on the trunk part of the network. The program is designed to handle a situation where the offered traffic arises from subscriber units which may have from 1 up to 8 independent connections into the network. (Author)

N75-33297/3CP PC **A03**/MF **A01**
Signals Research and Development Establishment, Christchurch (England).
A Computer Program for the Simulation of Store and Forward Telegraph Networks.
W. J. Cullyer, P. H. Masterman, and M. C. Butler. Oct 74, 47p Rept nos. SRDE-73038, BR46207

Descriptors: *Buffer storage, *Computerized simulation, *Data transmission, *Telegraph systems, Addressing, Messages, Networks, Switches.

A description is given of a means of simulating the flow of telegraph messages through a network of store-and-forward switches. Messages may be multi-address and have any one of five levels of precedence. The modelling process is carried down to the level of individual subscribers. Buffers within the switches are represented in a simple manner but no other aspects of the internal operation of switches are modelled. The output facilities are comprehensive and include gross statistics, such as median delays for each level of precedence, as well as more detailed information. (Author)

N76-16129/8CP PC **A06**/MF **A01**
Hughes Aircraft Co., El Segundo, Calif. Space and Communications Group.
Technology Forecasting for Space Communication. Task One Report: Cost and Weight Tradeoff Studies for Eos and Tdrs.
Nov 74, 108p Rept no. NASA-CR-144713
Contract NAS5-22178

Descriptors: *Communication satellites, *Cost estimates, *Landsat satellites, *Tdr satellites, *Tradeoffs, *Weight analysis, Algorithms, Computer programs, Ground stations, Homodyne reception, Optical communication, Optimization.

Weight and cost optimized EOS communication links are determined for 2.25, 7.25, 14.5, 21, and 60 GHz systems and for a 10.6 micron homodyne detection laser system. EOS to ground links are examined for 556, 834, and 1112 km EOS orbits, with ground terminals at the Network Test and Tracking Facility and at Goldstone. Optimized 21 GHz and 10.6 micron links are also examined. For the EOS to Tracking and Data Relay Satellite to ground link, signal-to-noise ratios of the uplink and downlink are also optimized for minimum overall cost or spaceborne weight. Finally, the optimized 21 GHz EOS to ground link is determined for various precipitation rates. All system performance parameters and mission dependent constraints are presented, as are the system cost and weight functional dependencies. The features and capabilities of the computer program to perform the foregoing analyses are described. (Author)

N76-16310/4CP PC **A03**/MF **A01**
Technische Hogeschool, Eindhoven (Netherlands). Dept. of Electrical Engineering.
Analysis and Simulation of a Syndrome Decoder for a Constraint Length K Equals 5, Rate R Equals 1/2 Binary Convolutional Code.
J. P. M. Schalkwijk, A. J. Vinck, and L. J. A. E. Rust. Apr 75, 43p Rept nos. TH-75-E-58, ISBN-90-6144-058-0

Descriptors: *Binary codes, *Computerized simulation, *Convolution integrals, *Decoders, Computer programs, Error correcting codes, Hardware, Signal encoding, Tables (Data).
Identifiers: Netherlands.

An analysis and a computerized simulation were carried out for a syndrome decoder in order to determine the minimum amount of hardware required. The principle of syndrome decoding for $R=1/2$ convolutional codes is explained, and the differences between Viterbi and syndrome decoding are described with regard to path registers and metric calculations. The selection of a particular $k=5$ code is justified. Three codes are compared by computerized simulation, and a code is selected because the number of associated path registers is only nine and the metric table contains 1817 entries. This code has a good error correcting capability, and the amount of hardware of the syndrome decoder is significantly smaller than that of the classical Viterbi decoder. (Author)

N76-18203/9CP PC **A12**/MF **A01**
Raytheon Co., Sudbury, Mass. Equipment Development Lab.
Space Vehicle Onboard Command Encoder.
Final Report.
17 Dec 75, 271p Rept nos. NASA-CR-147459, ER-75-4458
Contract NAS9-14372

Descriptors: *Coders, *Command and control, *Space shuttles, *Spacecraft electronic equipment, Algorithms, Computer programs, Electronic modules, Electronic packaging, Systems engineering.

A flexible onboard encoder system was designed for the space shuttle. The following areas were covered: (1) implementation of the encoder design into hardware to demonstrate the various encoding algorithms/code formats, (2) modulation techniques in a single hardware package to maintain comparable reliability and link integrity of the existing link systems and to integrate the various techniques into a single design using current technology. The primary function of the command encoder is to accept input commands, generated either locally onboard the space shuttle or remotely from the ground, format and encode the commands in accordance with the payload input requirements and appropriately modulate a subcarrier for transmission by the baseband RF modulator. The following information was provided: command encoder system design, brassboard hardware design, test set hardware and system packaging, and software. (Author)

N76-22246/2CP PC **A03**/MF **A01**
Federation of Rocky Mountain States, Inc., Denver, Colo.
Data Collection Operational Support System, Part 1.
Final Report.
W. R. Woughter, Jr. Nov 75, 41p Rept no. NASA-CR-144746
Contract NAS5-20533

Descriptors: *Ats 6, *Data acquisition, *Data links, *Satellite transmission, *Spacecraft communication, Computer programs, Digital systems, Education, Minicomputers, Technology utilization, Very high frequencies.

The Data Collection Operational Support system has been shown to be a usable means of transmitting numerical data over a 2-way VHF satellite link. It is also capable of supporting educational applications. The design, operation, use, results, and recommendations of the system are discussed. (Author)

N76-32226/2CP PC **A08**/MF **A01**
Aerospace Corp., El Segundo, Calif.
Shuttle User Analysis (Study 2.2): Volume 3. Business Risk and Value of Operations in Space (Bravo). Part 4: Computer Programs and Data Look-Up.
30 Sep 74, 159p Rept nos. NASA-CR-148750, ATR-74(7342)-1-V-3-PT-4
Contract NASW-2575
Seri-4.

Descriptors: *Communication satellites, *Space missions, *User manuals (Computer programs), Cost estimates, Payloads, Tables (Data), Telecommunication.

Computer program listings as well as graphical and tabulated data needed by the analyst to perform a BRAVO analysis were examined. Graphical aid which can be used to determine the earth coverage of satellites in synchronous equatorial orbits was described. A listing for satellite synthesis computer program as well as a sample printout for the DSCS-11 satellite program and a listing of the symbols used in the program were included. The APL language listing for the payload program cost estimating computer program was given. This language is compatible with many of the time sharing remote terminals computers used in the United States. Data on the intelsat communications network was studied. Costs for telecommunications systems leasing, line of sight microwave relay communications systems, submarine telephone cables, and terrestrial power generation systems were also described. (Author)

N77-18318/4CP PC **A05**/MF **A01**
Marconi Co. Ltd., Chelmsford (England). Mathematical Physics and Circuitry Group.
Performance Analysis of Viterbi Decoding of Convolutional Coded Data Transmitted over a Non-Linear Channel Using Modsim. Volume 1: Theory and Test Cases.
J. K. Potts, S. Shepherd, and C. R. Telfer. Jun 76, 83p Rept no. ESA-CR(P)-881-V-1
Contract ESTEC-2327/74-HP
Seri-2.

Descriptors: *Computerized simulation, *Data transmission, *Signal encoding, Nonlinear systems, Performance prediction, Convolution integrals, Decoding, Error analysis, Intersymbolic interference, Monte carlo method, Random noise, Signal processing.
Identifiers: Viterbi decoding, *Convolutional codes, Great Britain, MODSIM computer program.

A method is described for computing the upper bound of the event and bit error probabilities for convolutional coded data in the presence of correlated or signal dependent noise. Preference probabilities for error paths are computed by a quasi Monte Carlo technique known as importance sampling and extrapolated for longer paths. The required upper bounds are computed as sums of preference probabilities weighted by the corresponding numbers of error paths or the error counts on them. Examples are given for hard and soft decision decoding metrics.

N77-18319/2CP PC **A08**/MF **A01**
Marconi Co. Ltd., Chelmsford (England). Mathematical Physics and Circuitry Group.
Study of Spread Spectrum and Convolutional Code Techniques. Volume 2: Software Descriptions.
S. Shepherd, C. R. Telfer, and B. G. West. Apr 76, 161p Rept no. ESA-CR(P)-881-V-2
Contract ESTEC-2327/74-HP
Seri-2.

Descriptors: *Computer programs, *Computerized simulation, *Signal encoding, Performance prediction, Convolution integrals, Data transmission, Decoding, Error analysis, Multiplexing, Nonlinear systems, Power spectra, Signal processing, User manuals (Computer programs).
Identifiers: *Spread spectrum technique, *Convolutional codes, Great Britain.

User manuals and software descriptions are presented for three computer programs, which analyze the performance of data transmission systems using convolutional codes. The functions of the programs are as follows: program A 1 calculates certain parameters of the state diagram, given the generators of a particular convolutional code program T 6 takes as input certain state-diagram parameters and enumerates the paths traced between states by a Viterbi decoder, after divergence from the correct path; program REAL calculates an upper bound on error probabilities for Viterbi decoding of convolutionally-encoded data, after passage through a noisy distorting channel.

N77-18320/0CP PC **A05**/MF **A01**
Marconi Co. Ltd., Chelmsford (England). Mathematical Physics and Circuitry Group.
Performance Analysis of Psk Signals Through Fading Channels.
P. G. Wright. Jun 76, 84p Rept no. ESA-CR(P)-882
Contract ESTEC-2327/74-HP

Descriptors: *Channels (Data transmission), *Fading, *Performance prediction, *Phase shift keying, *Signal processing, Adaptive filters, Computer programs, Equalizers (Circuits), Error analysis, Random noise.
Identifiers: Great Britain, Radio transmission, Communication theory.

The passage of PSK signals through fading channels, in the presence of noise, was analyzed, both when the channel has a flat frequency response (i.e. constant across the frequency band), and a non-flat one. Analytic expressions for the error rate were derived in cases where the receiver includes carrier phase correction, and where it does not. It is assumed the rate of fading is small compared with the bit rate, so that phase correction is feasible. In the case of non-flat fading, an adaptive equalizer was also analyzed. A simple computer program is given to evaluate the error rate for a phase-tracked flat fade, and a method is given by which a non-flat fade can be reduced to an equivalent flat fade, under certain circumstances.

N77-18784/7CP PC **A09**/MF **A01**
Marconi Co. Ltd., Chelmsford (England). Mathematical Physics and Circuitry Group.
Analytic Techniques for Processing Signal and Noise Through a Non-Linear Channel Using Modsim. Volume 2: Software Description.
S. G. Brazier, and B. G. West. Apr 76, 195p Rept no. ESA-CR(P)-878-V-2
Contract ESTEC-2327/74-HP
Seri-2.

Descriptors: *Computerized simulation, *Nonlinear systems, *Random noise, *Signal processing, Computer programs, Curve fitting, Fast fourier transformations, Signal to noise ratios.
Identifiers: West Germany.Identifiers: Great Britain, MODSIM computer program.s.

A description is presented of modifications to MODSIM, a simulation program for transmission of a signal through a nonlinear noisy channel, to account for signal behavior. The analytical technique adopted to account for the effect of noise is a polygonial expansion of the nonlinear device characteristics. Specifications of additions to the MODSIM software are given, and a curve-fitting program is described.

N77-21110/0CP PC **A11**/MF **A01**
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
The Deep Space Network.
Progress Report, Jan. - Feb. 1977.
15 Apr 77, 226p Rept nos. NASA-CR-152647, PR-42-38
Contract NAS7-100

Descriptors: *Data acquisition, *Data transmission, *Deep space network, *Spacecraft communication, *Spacecraft tracking, Management planning, Computer programs, Mariner Jupiter-Saturn flyby, Mathematical models, Mission planning, Radio frequency interference, Telemetry, Viking orbiter spacecraft.

For abstract, see STAR 1512

N77-21913/7CP PC **A05**/MF **A01**
Grenoble Univ. (France). Lab. de Mathematiques Appliquees.
Development of Smoothing Spline Functions for Telemetry Data. Volume 3: Programs and Numerical Results Etude du Developpement des Fonctions-Spline de Lissage pour des Donnees de Telemesure. Volume 3 (Programmes et Resultats Numeriques).
C. Dicrescenzo. Dec 76, 92p Rept no. ESA-CR(P)-901-V-3
Contract ESOC-553/73-AR
Seri-3.
Language in French.

Descriptors: *Computer programs, *Data smoothing, *Spline functions, *Telemetry, Algorithms, Convexity, Fortran, Inequalities, Interpolation.
Identifiers: France, Convex functions, *Spline interpolation.

Computer programs are described for the calculation of four types of spline functions performing minimization of interpolation, smoothing, inequality type constants, and association with convex function, based on previously developed algorithms. The methods used are compared from a numerical point of view. All the methods were written as a FORTRAN subprogram.

N77-33875/4CP PC **A03**/MF **A01**
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Tracking and Data Acquisition Engineering Div.
Review of Finite Fields: Applications to Discrete Fourier, Transforms and Reed-Solomon Coding.
J. S. L. Wong, T. K. Truong, B. Benjauthrit, B. D. L. Mulhall, and !. S. Reed. 15 Jul 77, 32p Rept nos. NASA-CR-!55167, JPL-PUB-77-23
Contract NAS7-100

Descriptors: *Discrete functions, *Fourier transformation, Finite element method, Communication satellites, Computer programs, Heuristic methods, Numerical analysis.
Identifiers: Discrete Fourier transform, Reed-Solomon codes.

An attempt is made to provide a step-by-step approach to the subject of finite fields. Rigorous proofs and highly theoretical materials are avoided. The simple concepts of groups, rings, and fields are discussed and developed more or less heuristically. Examples are used liberally to illustrate the meaning of definitions and theories. Applications include discrete Fourier transforms and Reed-Solomon coding.

N78-16221/1CP PC **A07**/MF **A01**
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
State Criminal Justice Telecommunications (Stacom). Volume 4: Network Design Software User'S Guide.
Final Report.
J. J. Lee. 31 Oct 77, 148p Rept nos. NASA-CR-155555, JPL-PUB-77-53-V-4
Contract NAS7-100
Seri-4. Subm-Sponsored in Part by Dept. Of Justice.

Descriptors: *Computer networks, *Computer programs, *Law (Jurisprudence), *Telecommunication, *User manuals (Computer programs), Digital systems, Fortran, Network analysis, Univac 1108 computer.
Identifiers: Fortran 5 programming language, Criminal justice, State government.

A user's guide to the network design program is presented. The program is written in FORTRAN V and implemented on a UNIVAC 1108 computer under the EXEC-8 operating system which enables the user to construct least-cost network topologies for criminal justice digital telecommunications networks. A complete description of program features, inputs, processing logic, and outputs is presented, and a sample run and a program listing are included.

N78-17281/4CP PC **A04**/MF **A01**
Technical Univ. of Denmark, Lyngby. Lab. of Electromagnetic Theory.
A Study of Interference in Satellite Broadcasting.
E. Voeljensen. Aug 77, 55p Rept no. TUD-R-188

Descriptors: *Radio frequency interference, *Satellite television, *Television transmission, Antenna radiation patterns, Computer programs, Communication satellites, Computerized simulation, Flow charts, Signal to noise ratios.
Identifiers: Denmark.

The World Administrative Radiocommunications Conference (WARC), Geneva 1977, approved a plan for satellite TV broadcasting. A computer model simulating a system of co-channel and adjacent channel satellite transmitters is presented. Introductory investigations of interference problems were performed in selected case studies comprising a system of 17 co-channel satellite transmitters in a regular configuration and a model of channel 12 of the WARC plan. A special tool (the interference picture) for analyzing the interference at a given receiver location is described.

N78-21334/5CP PC **A03**/MF **A01**
Communications Research Centre, Ottawa (Ontario).
Ionospheric Effects on the Doppler Frequency Shift in Sarsat Propagation.
D. B. Muldrew, and H. G. James. Feb 78, 43p
Rept no. CRC-1313

Descriptors: *Doppler effect, *Frequency shift, *Satellite tracking, Ionospherics, Computer programs, Electron density(Concentration), Transmitters, Transponders.
Identifiers: Canada, OSCAR-6 satellite, High frequency, Radio transmission.

Ionospheric effects were estimated for a proof of concept SARSAT experiment using the AMSAT OSCAR-6 satellite. In this case, the down link was at 30 MHz and the daytime ionosphere with no horizontal gradients in electron density can change the Doppler frequency by a few hertz. Horizontal gradients of electron density can have more effect on the Doppler frequency than the vertical distribution of density since the negative vertical density gradient in the topside ionosphere tends to compensate the Doppler effect due to the positive gradient in the bottomside. In the late afternoon, evening and nighttime, large east-west troughs in the density distribution exist which can produce shifts of a few tens of hertz at 30 MHz. The Doppler frequency shift due to the ionosphere varies approximately inversely as the frequency.

N78-23271/7CP PC **A03**/MF **A01**
Missouri Univ., Rolla.
Phase-Lock Loop Models for Systid Simulations, Volume 4.
Final Report.
W. H. Tranter, and M. D. Turner. Jul 77, 45p
Rept nos. NASA-CR-151713, CSR-77-3-V-4
Contract NAS9-14848

Descriptors: *Computerized simulation, *Phase locked systems, Loops, Nonlinear systems, Signal to noise ratios, Algorithms, Computer programs, Frequency modulation, Input/output routines, Transient response.

Phase lock loop models were developed for use in SYSTID simulations, and guidelines for parameter selection were given. Two different models, SOPLL1 and SOPLL2, allow for use with and without a hard limiter at the loop input. Several tests were run to validate loop performance. These include transient response tests, phase error variance tests, and signal to noise ratio tests. These last tests utilize the phase lock loop as an FM discriminator, for which the detection gain was determined for a wide range of signal to noise ratios. All tests illustrate that model performance is satisfactory.

N78-30483/9CP PC **A03**/MF **A01**
Applied Physics Lab., Johns Hopkins Univ., Laurel, Md. Space Dept.
Prediction of Attenuation of the 28 Ghz Comstar Beacon Signal Using Radar and Measured Rain Drop Spectra.
J. Goldhirsh. Feb 77, 46p Rept nos. NASA-CR-156810, APL/JHU-S1R78U-009
Contract NASA ORDER S-50748-A, Contract, N00017-72-C-4401

Descriptors: *Beacon satellites, *Radio attenuation, *Raindrops, Radar measurement, Computer programs, Piezoelectric gages, Signal fading, Telecommunication.
Identifiers: Microwaves, Microwave communication, Superhigh frequencies.

Disdrometer measurements and radar reflectivity measurements were injected into a computer program to estimate the path attenuation of the signal. Predicted attenuations when compared with the directly measured ones showed generally good correlation on a case by case basis and very good agreement statistically. The utility of using radar in conjunction with disdrometer measurements for predicting fade events and long term fade distributions associated with earth-satellite telecommunications is demonstrated.

N78-31350/9CP PC **A10**/MF **A01**
Marconi Co. Ltd., Chelmsford (England). Theoretical Support Services.
Link Analysis Program Linkan. Volume 1: Theoretical and Programmer'S Manual.
P. G. Wright, and B. G. West. Apr 78, 223p Rept no. ESA-CR(P)-1083-V-1
Contract ESA-3259/77-NL-AK
Seri-2.

Descriptors: *Ground-air-ground communications, *Signal to noise ratios, *Spacecraft communication, *Transmission lines, Computer programming, Fading, Numerical analysis, Statistical analysis, Subroutines, Weather.
Identifiers: Great Britain, LINKAN computer program.

The theory and programming methods used in developing the program LINKAN, which performs noise analysis of fading satellite communication links, are described. The analysis includes the treatment of non-linear satellite amplifiers, fading due to weather effects and aerial pointing losses, and the relation between the downlink noise and the downlink weather fading. The result is the distribution of the overall signal to noise ratio.

N78-31351/7CP PC **A04**/MF **A01**
Marconi Co. Ltd., Chelmsford (England). Theoretical Support Services.
Link Analysis Program Linkan.
P. G. Wright, and B. G. West. Apr 78, 56p Rept no. ESA-CR(P)-1083-V-2
Contract ESA-3259/77-NL-AK
Seri-2.

Descriptors: *Ground-air-ground communications, *Spacecraft communication, *Transmission lines, *User manuals(Computer programs), Computer programs, Fading, Statistical analysis, Weather.
Identifiers: Great Britain, LINKAN computer program.

The use of the program LINKAN to perform noise analysis on satellite communications links is described featuring a fading uplink and downlink, and a non-linear amplifier in the satellite. Fade distributions are specified numerically, or as certain standard distributions, and may be specified by aerial pointing error distributions together with the antenna gain. The variation of downlink noise with weather conditions is allowed for. The result is the distribution of the overall signal to noise ratio.

PB-210 582/CP $9.00/deck
Federal Communications Commission, Washington, D.C. Spectrum Management Task Force.
PERDIS Bearing and Distance Computer Program
6 Jul 72, 694 card
Punched cards $9.00/deck of 694 cards.

Descriptors: *Radio broadcasting, *Computer programs, Punched cards, Bearing(Direction), Distance, FORTRAN.
Identifiers: PERDIS computer program, FORTRAN 5 programming language.

'PERDIS' is a FORTRAN V computer program written to give broadcast engineers the great circle path length and bearing from one point to another. The program inputs are a series of up to 100 sets of points, identified by a 6-letter code and its respective co-ordinates. The outputs are the distance, bearing, and mid-latitude between all combinations of the 100 sets of points. (Author)

PB-211 500/CP PC **A05**/MF **A01**
Federal Communications Commission, Washington, D.C. Common Carrier Bureau.
Geostationary Orbit Avoidance Computer Program
Richard G. Gould. Sep 72, 79p Rept no. CC-7201
See also PB-211 501

Descriptors: *Radio relay systems, Requirements, *Communication satellites, Radiofrequency interference, *Computer programs, Programming manuals, Synchronous satellites, Microwave relay systems, MW line of sight communication, Circular orbit, Equatorial orbit, Electromagnetic interference.
Identifiers: Geostationary orbit avoidance.

The report describes a computer program for the calculation of azimuths to be avoided by 6GHz radio-relay transmitting antennas, as required by FCC Rules, Section 21.1083, to control interference reaching the geostationary orbit. The program is designed for use on IBM 360 computers, but can be easily modified for use on other machines. (Author)

PB-211 501/CP PC **E04**/deck
Federal Communications Commission, Washington, D.C. Common Carrier Bureau.
Geostationary Orbit Avoidance Computer Program (Card Deck)
1972, 429 cards
See also PB-211 500
Punched cards $7.00/deck of 429 cards.

Descriptors: *Radio relay systems, Requirements, *Communication satellites, Radiofrequency interference, *Computer programs, Punched cards, Synchronous satellites, Microwave relay systems, MW line of sight communication, Circular orbit, Equatorial orbit, Electromagnetic interference.
Identifiers: Geostationary orbit avoidance.

A computer program was developed for the calculation of azimuths to be avoided by 6GHz radio-relay transmitting antennas, as required by FCC Rules, Section 21.108(e), to control interference reaching the geostationary orbit. The program is designed for use on IBM System 360 computers, but can be easily modified for use on other machines. This card deck contains the source program and data cards for several test cases. (Author)

PB-220 657/1CP PC **A04**/MF **A01**
General Electric Co., Bethesda, Md. Information Services Business Div.
Teleprocessing Systems Study. Volume I
Final rept.
David J. McKee, Richard C. Raymond, and William F. Tiernan. 30 Apr 73, 74p* OTP-73-TP-1
Contract OTP-SE-72-115
Paper copy also available from NTIS $24.00/set of 4 reports as PB-220 656-SET.

Descriptors: *Data processing terminals, Mathematical models, *Telecommunication, Data processing terminals, Data transmission, Computer programming, Systems analysis, Economic analysis, Interfaces, Time sharing, Switching systems, Graphic methods, FORTRAN.
Identifiers: Data bases, GE Mark 3 computers, FORTRAN 4 programming language, OTPEOP.

A mathematical model of data-based teleprocessing systems was developed as a policy analysis tool. This interactive model, in the form of a FORTRAN 4 GE Mark 3 computer program and associated data bases, is capable of determining the cost of a teleprocessing system designed to meet specified load requirements. The model was first exercised with several representative teleprocessing systems and then used to determine whether economies of scale exist in such systems. Within the framework of assumptions used in constructing the model, it can be concluded that economies of scale do exist to a certain point and that hybrid teleprocessing systems are economically viable. The volume is the first of the three volumes which constitute the final report for this project. Study background, model description, results, and conclusions are incorporated herein. (Author)

PB-220 658/9CP PC **A11**/MF **A01**
General Electric Co., Bethesda, Md. Information Services Business Div.
Teleprocessing Systems Study. Volume II. User Instruction Manual
Final rept.
David J. McKee, Richard C. Raymond, and William F. Tiernan. 30 Apr 73, 250p OTP-73-TP-2
Contract OTP-SE-72-115
Paper copy also available from NTIS $24.00/set of 4 reports as PB-220 656-SET.

Descriptors: *Data processing terminals, Mathematical models, *Telecommunication, Data processing terminals, Data transmission, Programming manuals, FORTRAN, Time sharing, Switching systems.
Identifiers: GE Mark 3 computers, Data bases, OTPEOP.

The purpose of the report is to be a user instruction and reference manuals for individuals using the teleprocessing systems model. (Author)

PB-220 659/7CP PC **A99**/MF **A01**
General Electric Co., Bethesda, Md. Information Services Business Div.
Teleprocessing Systems Study. Volume III. Program Listings and Documentation
Final rept.
David J. McKee, Richard C. Raymond, and Willaim F. Tiernan. 30 Apr 73, 897p OTP-73-TP-3
Contract OTP-SE-72-115
Paper copy also available from NTIS $24.00/set of 4 reports as PB-220 656-SET.

Descriptors: *Data processing terminals, Mathematical models, *Telecommunication, *Computer systems programs, Data transmission, FORTRAN, Systems analysis, Time sharing, Switching systems, Multiplexing, Interfaces.
Identifiers: FORTRAN 4 programming language, GE Mark 3 computers, Data bases, OTPEOP.

The report contains the flow charts, listings of the input data file, program listings (in FORTRAN 4 for the General Electric MARK 3 foreground service), and supplemental information for the teleprocessing systems model.

PB-220 660/5CP PC **A03**/MF **A01**
General Electric Co., Bethesda, Md. Information Services Business Div.
Teleprocessing Systems Study. Description of the Model
Technical paper
Richard C. Raymond, and David J. McKee. 30 Apr 73, 42p OTP-73-TP-4
Contract OTP-SE-72-115
Paper copy also available from NTIS $24.00/set of 4 reports as PB-220 656-SET.

Descriptors: *Data processing terminals, Mathematical models, *Telecommunication, Data processing terminals, Data transmission, Computer programming, FORTRAN, Time sharing, Switching systems, Graphic methods, Trees(Mathematics), Cost analysis.
Identifiers: FORTRAN 4 programming language, GE Mark 3 computers, OTPEOP.

The report describes the model developed for the Teleprocessing Systems Study and in example of its use. The model, in the form of a FORTRAN 4 GE Mark 3 computer program and associated data bases, is capable of determining the cost of a teleprocessing system designed to meet specified load requirements. In the current version, the system may serve up to 120 cities, of which up to 20 may be outside of the continental United States. Central switching and data processing may be provided in up to 20 computing centers located at arbitrarily chosen cities of the system. The model selects terminal equipment to be deployed in each city and central-station equipment for each computing center. Data communication is provided optionally by means of leased circuits configured in either ring or tree networks, direct-distance-dialing services, WATS-like services, or packet-switched services. The model is suitable for exploration of system costs and design features as functions of deployment, center locations, types and amounts of work processed, common-carrier tariffs, redundancy requirements, and other variables.

PB-221 257/9CP PC **A05**/MF **A01**
Federal Communications Commission, Washington, D.C. Research Div.
PERDIS. A Computer Program to Determine if Two Antenna Beams Intersect and Provide the Perpendicular Distance Between the Beam Axes
Final rept.
Gary S. Kalagian, and Roger B. Carey. 1 Feb 72, 86p Rept no. R-7201
See also report dated 6 Jul 72, PB-210 582.

Descriptors: *Radio broadcasting, *Computer programs, *Radio beams, *Radiofrequency interference, Communication satellites, Radio relay systems, Bearing(Direction), Distance, Programming manuals, FORTRAN.
Identifiers: PERDIS computer program, UNIVAC 1108 computers, FCC.

A computer program has been developed to determine if there is a common volume resulting from the partial or complete intersection of the antenna beams from a satellite communications system earth station and any one of a number of surrounding terrestrial microwave stations. The program computes the shortest (perpendicular) distance between the beam axes and compares this with a distance equal to one half of the sum of the antenna pattern beamwidths at the point where the shortest distance line intersects each beam axis. The program is written in FORTRAN for the UNIVAC 1108 but is adaptable to most third generation computers. The program is completely universal in that it can be used for calculations involving any location on earth, with any antenna pointing configurations and any beamwidths. Complete flow diagrams, input/output formats and computer instructions are included.

PB-233 364/9CP PC **A07**/MF **A01**
Forest Service, Washington, D.C.
Wilderness Area Simulation Model - User's Manual
Final rept.
N. A. Heck, and D. B. Webster. Jun 73, 141p* Rept no. USFS-R-74-01
Prepared by Resources for the Future, Inc., Washington, D.C. and IBM Corp. For computer program, see PB-233 488.

Descriptors: *Natural resources, *Outdoor recreation, *Computerized simulation, *Travel, *Computer programs, Transportation, Traffic control, Management methods, Rural development areas, Manuals, Networks, Regional planning, Routes, Travel time.
Identifiers: *Wilderness areas, Simulation models, General purpose simulation systems.

The wilderness area simulation model has been developed to give wilderness managers a planning tool that permits simulation and analysis of visitor travel and encounters in wilderness areas. It can be used to treat and analyze alternative management plans prior to implementation in the field. The manual explains the situation, explains the model, outlines the use and available outputs of the model, and includes a complete program description for computer application.

PB-233 488/6CP CP **T03**
Forest Service, Washington, D.C.
Wilderness Area Simulation Model
N. A. Heck, and D. B. Webster. Jun 73, 1 reel mag tape* Rept no. USFS-R-74-02
Prepared by Resources for the Future, Inc., Washington, D.C. and IBM Corp.
Price includes documentation, PB-233 364. Specify tape recording mode desired: 7 track, 556 and 800 BPI, odd and even parity, BCD; or 9 track, 800 BPI, odd parity, EBCDIC. Also availabe in punched cards.

Descriptors: *Natural resources, *Outdoor recreation, *Computerized simulation, *Travel, *Computer programs, Rural development areas, Magnetic tapes, Models, Transportation models, Management information systems, Management methods, Traffic control.
Identifiers: *Wilderness areas, General purpose simulation systems.

The computer program for a simulation model for travel and encounters in wilderness areas is available to managers for testing alternative wilderness management strategies. Detailed technical information can be obtained from the U.S. Forest Service, Computer Science Branch, Fort Collins Computer Center, 3825 East Mulberry Street, Fort Collins, Colorado 80521. This model simulation uses the library procedure, TRAFFIC, for the IBM's General Purpose Simulation System V, (GPSS V) which operates on an IBM s/360 using the OS operating system.

PB-234 530/4CP PC **A07**/MF **A01**
Stanford Research Inst., Menlo Park, Calif.
Incorporation of Monitoring Data in the Frequency Assignment Process of the FCC Spectrum Management Task Force
Final rept. Apr-Nov 73
T. I. Dayharsh, T. J. Yung, V. E. Hatfield, R. C. Kunzelman, and B. M. Sifford. Jan 74, 132p* FCC-0039-A174
Contract FCC-0039

Descriptors: *Mobile equipment, *Communications management, *Frequency allocations, Algorithms, Data processing, Monitors, Computer programs, Statistical analysis, Ranking.
Identifiers: *Spectrum management, MSMU(Mobile Spectrum Monitoring Units), RANKIN computer program, AFAM(Automated Frequency Assignment Model), Automated frequency assignment model, *Mobile spectrum monitoring units, RDTAPE computer program.

Radio spectrum monitoring data is used to determine how and to what extent members of the land mobile radio community use their assigned channels. Study has developed techniques, algorithms, and data files that can effectively incorporate monitoring data in the frequency assignment process. The research investigated types of channel quality measures that can be derived from monitoring data, validity of data and means for assuring validity, algorithms and processing flow to handle data from acquisition through input to frequency assignment program, effects of space and time stationarity on monitoring plan and channel ranking, and operational characteristics of radio users.

PB-235 201/1CP PC **E04**/MF **A01**
Philco-Ford Corp., Willow Grove, Pa. Communication Systems Div.
Conversion Subsystems for the Electronic Mail Handling Program. Task II Report, A Digital Simulation Model
Nov 72, 78p USPS/1702-103
Contract USPS-72-1-02779
Paper copy also available in set of 6 reports as PB-235 198-SET, PC E99.

Descriptors: *Mail processing, *Electronic engineering, *Systems engineering, *Computerized simulation, Output, Quality assurance, Performance standards, Telecommunication, Character recognition, Conversion, Digital simulation, Graphic methods, Input, Mathematical models.
Identifiers: *Mail input conversion, *Mail output reconversion, *Electronic mail handling, Alternatives.

The report summarizes the work performed in developing a computer simulation model of an electronic mail handling conversion subsystems. This simulation must be capable of providing quantitative measurements of output copy quality as a function of key system parameters as needed. The parameters to be varied include the performance characteristics of the alternative conversion techniques employed in two recommended systems.

PB-235 202/9CP PC **E07**/MF **A01**
Philco-Ford Corp., Willow Grove, Pa. Communication Systems Div.

Conversion Subsystems for the Electronic Mail Handling Program. Task IIIA Report, Evaluation of Data Compression Techniques
Jan 73, 189p USPS/1702-104
Contract USPS-72-1-02779
Paper copy also available in set of 6 reports as PB-235 198-SET, PC E99.

Descriptors: *Mail processing, *Data processing, *Electronic engineering, Graphic methods, Input, Output, Quality assurance, Measurement, Computerized simulation, Digital computers, Character generators, Coding, Postal service.
Identifiers: *Mail input conversion, *Mail output reconversion, *Electronic mail handling, Visual quality.

The objective concerns the investigation of applicable data compression techniques for graphics by means of digital computer simulations, and the measurement of output document quality. The task was directed toward the following: (a) The measurement of the data compression ratio for graphic input material, using several encoding schemes; (b) the measurement of output document quality, including qualitative measurement of the visual quality of hard copy output documents, and analytic measurement of output document quality using a set of standard input characters including alphanumerics and symbols.

PB-236 272/1CP PC **A04**/MF **A01**
Federal Communications Commission, Washington, D.C. Research and Standards Div.
VHF-TV, Computer Assignment Program (VCAP)
Gary S. Kalagian. Aug 74, 69p Rept no. FCC/OCE/RS74-01

Descriptors: *Frequency allocations, *Television broadcastings, Computer programs, Very high frequencies, Communications management, FORTRAN.
Identifiers: VCAP computer program, FORTRAN 5 programming language.

The computer program determines new channel assignment for locations supplied as input data. The existing table of channel assignments in the United States, Canada and Mexico as well as preselected sets of co-channel and adjacent channel separation distances are used in the determination. The program selects the channel, from the possible channels at each location, that will result in the most efficient assignment plan. This program is written in FORTRAN V for use on a UNIVAC 1108 computer.

PB-238 019/4CP PC **A18**/MF **A01**
Systems Applications, Inc., San Rafael, Calif.
The Domestic Telecommunications Industry: Economic Behavior, Competition, and Public Policy. Appendices
George P. Mandanis, Richard N. Lane, John R. Myers, Peter Stanek, and Martin Melnick. 12 Jun 74, 403p* R73-40-App, OTP-SE-73-110-App
See also PB-238 020.

Descriptors: *Telecommunication, *Common carriers, *Economic analysis, Industries, Competition, Cost analysis, Demand(Economics), Economic forecasting, Computer programs, Fees, FORTRAN.
Identifiers: Computer aided analysis, Communications networks, Sensitivity analysis.

The appendices present static and dynamic analyses, demand forecasts, sensitivity analysis, and computer programs used. Portions of this document are not fully legible.

PB-239 680/2CP
Mag Cards $375.00;Foreign $470.00
Electromagnetic Compatibility Analysis Center, Annapolis, Md.
EMC Analytical Models for Programmable Desk Top Calculators
Models-Simulation
Richard Larson. 1974, 30 magnetic cards
Specify designation of calculator: HP-9810, PB-239 681; or HP-9820, PB-239 682. Documentation available with package only.

Descriptors: *Models-simulation, *Electromagnetic compatibility, *Computer programs, *Magnetic cards, Frequency allocations, Signal processing.
Identifiers: HP 9810 computers, HP 9820 computers, Desktop calculators.

10 Desk top calculator programs are contained in this package. Their primary function is that of electromagnetic compatibility analyses. They are: Empirical propagation path loss or power density calculations (30-10,000 MHz); Receiver off-frequency rejection calculation for interfering pulsed signals; Receiver off-frequency rejection calculation for interfering analog signals; Calculation of signal-to-noise, interference-to-noise, or signal-to-interference ratio; Calculation of intermodulation free frequencies from a given input list; Calculation of harmonic free frequencies from a given input list; Conversion of geographic (latitude/longitude) Coordinates to Universal Transverse Mercator Coordinates; Conversion of Universal Transverse Mercator Coordinates to Geographic (latitude/longitude) Coordinates; Calculation of bearing and distance between two locations; Calculation of geographic location at a given bearing and distance from a site. These programs are operable on the Hewlett Packard calculator, models HP-9810 and HP-9820. They are adaptations of appropriate mathematical models from the Computer Program Library at Electromagnetic Compatibility Analysis Center. Each program is stored on a separate magnetic card. Please specify designation of calculator (HP-9810 or HP-9820) when ordering.

PB-240 199/0CP PC **A06**/MF **A01**
Federal Communications Commission, Washington, D.C. Research and Standards Div.
User's Manual for COORD (FCC Coordination Contour Program for Domestic Satellite Earth Stations)
George L. Sharp. Nov 74, 114p Rept no. FCC/OCE/RS74-03

Descriptors: *Radio relay stations, *Computer programs, Communication satellites, Contours, Coordination, Radio relay systems, FORTRAN.
Identifiers: FORTRAN 5 programming language.

The report is a user's manual for, and a short description of, a FORTRAN V computer program for the calculation of the coordination contour around an international or domestic satellite earth station. It is a modification of a program written by the Department of Commerce, Office of Telecommunications, with modifications to meet the needs of users throughout the telecommunications industry. The program is a computerization of the procedure outlined in Appendix 28 of the Final Acts of the World Administrative Radio Conference for Space Telecommunications (WARC-ST), which regulates the international coordination of an earth station, and of the similar procedure outlined in Part 25 of the FCC Rules and Regulations, which regulates the domestic coordination of an earth station. Portions of this document are not fully legible.

PB-240 349/1CP PC **A04**/MF **A01**
Federal Communications Commission, Washington, D.C. Research and Standards Div.
The Quasi-Stationary Satellite Orbit
John C. H. Wang, and Elton D. Davis. Jan 75, 67p Rept no. FCC/OCE/RS75-01

Descriptors: *Communication satellites, *Circular orbits, Spacecraft antennas, Tables(Data), Computer programs, Synchronous satellites, Spacecraft trajectories.

Three or four satellites equally spaced in a quasi-stationary satellite orbit can provide continuous earth coverage, but with advantages and disadvantages with respect to satellites in geostationary satellite orbit. This report presents general purpose equations, computer programs and tables for studying orbits with any reference longitude and inclination. Results of a sample system having eleven earth stations and a specific orbit with a reference longitude of 75 degrees west and an inclination of 60 degrees are also presented.

PB-241 306/0CP PC **A05**/MF **A01**
Federal Communications Commission, Washington, D.C. Research and Standards Div.
Convolution Method of Interference Calculation. User's Manual and Results
Allen Das, and George Sharp. Apr 75, 88p Rept no. FCC/OCE/RS75-04

Descriptors: *Radiofrequency interference, *Microwave relay systems, Convolution integrals, Frequency modulation, Communication satellites, Computation, Computer programs, Manuals.

Using convolution integrals, this program calculates the noise power ratio and the interference power of a desired frequency modulated signal from an interfering signal, such as single channel per carrier (SCPC), signal. The amount of interference power from a SCPC circuit into a 1200 channel frequency modulated signal is dependent on the carrier frequency of the SCPC circuit relative to the carrier frequency of the desired signal.

PB-241 307/8CP PC **A05**/MF **A01**
Federal Communications Commission, Washington, D.C. Research and Standards Div.
(UCAP) - UHF-TV Channel Assignment Program
Gary S. Kalagian. Jan 75, 89p Rept no. FCC/OCE/RS75-02

Descriptors: *Frequency allocations, *Television broadcasting, Computer programs, Ultrahigh frequencies, Communications management, FORTRAN.
Identifiers: UCAP computer program.

UCAP (UHF-TV Channel Assignment Program) is a FORTRAN computer program capable fo producing new UHF-TV channel assignment tables. Each new table is produced by changing the input parameters, which are: (1) the taboo separation distances and (2) the UHF channel numbers in the range LOW to HIGH. Each new table is subject to the following conditions: (1) The range of channel numbers (HIGH-LOW) must not exceed 48 channels; (2) Channel number 37 is not used; (3) Existing occupied assignments having a channel number greater than HIGH are given first priority for a reassigned number in the range LOW-HIGH; (4) Existing occupied assignments in the range 14-HIGH are not reassigned; (5) As many as possible of the existing unoccupied assignments in the channel range 14-83 are reassigned to the range LOW-HIGH.

PB-241 628/7CP CP **T03**
Federal Communications Commission, Washington, D.C. Research and Standards Div.
FCC Coordination Contour Program for Domestic Satellite Earth Stations
Software
J. M. Linthicum. Nov 74, 1 reel mag tape FCC/OCE/RS74-05, FCC/DF-74/024
Specify tape recording mode desired: 9 track, 800 or 1600 bpi, odd parity, EBCDIC; or 7 track, 556 or 800 bpi, odd or even parity, BCD. Also available as punched cards. Price includes User's Guide, PB-240 199.

Descriptors: *Software, *Radio relay stations, *Computer programs, Communication satellites, Radio relay systems, Coordination, FORTRAN, Magnetic tapes.
Identifiers: *Communication satellite terminals.

This is a computer program for the calculation of the coordination contour around an international or domestic satellite earth station. It is a modification of a program written by the Department of Commerce, Office of Telecommunications, with modifications to meet the needs of users throughout the telecommunications industry. The program is a computerization of the procedure outlined in Appendix 28 of the Final Acts of the World Administrative Radio Conference for Space Telecommunications (WARC-ST), which regulates the international coordination of an earth station, and of the similar procedure outlined in Part 25 of the FCC Rules and Regulations, which regulates the domestic coordination of an earth station ... Software description: This program was written in the FORTRAN V programming language for initial implementation on a UNIVAC 1106 computer using the EXEC 8 operating system. It requires less than 50k words of core memory for use on the UNIVAC 1106. It consists of one main program, nine subroutines and three functions.

PB-243 555/0CP PC **A09**/MF **A01**
Federal Communications Commission, Washington, D.C. Spectrum Management Task Force.
AFAM: Automatic Frequency Assignment Model
Phillip G. Tremper. Jul 75, 196p Rept no. FCC/OCE/SMTF-75-01

Descriptors: *Frequency allocations, *Communications management, Computer programs, Automatic, FORTRAN, Programming manuals, Radio communication.
Identifiers: FORTRAN 5 programming language, Land mobile radio communications, *Spectrum management, AFAM computer program.

The automatic frequency assignment model (AFAM) computer program is an integral part of the automated frequency assignment system (AFAS) being used by the Spectrum Management Task Force in the assignment of land mobile frequencies to users in the Chicago Regional area. The component parts of this program were developed independently by several groups, however, the culmination, linkage between models, and overall design of the present version of AFAM was developed and impelemented by the personnel in the Data Systems Group of the Spectrum Management Task Force. The report documents AFAM and the operational procedures of AFAM at this time. AFAM is written in FORTRAN V.

PB-243 680/6CP PC **A12**/MF **A01**
Stanford Research Inst., Menlo Park, Calif.
National and Regional Spectrum Management Planning Assistance. Volume II
Final rept.
K. D. Felperin, P. D. Shaft, T. L. Humphrey, O. S. You, and T. J. Yung. Feb 71, 263p FCC/OCE/SMTF-71/01-Vol-2
Contract FCC-RC-10121-71
See also Volume 1, PB-243 679.

Descriptors: *Frequency allocations, *Communications management, Regional planning, Radio communication, Radiofrequency interference, Computer programs, Computerized simulation, Utilization.
Identifiers: *Spectrum management, Land mobile radio communications.

Contents:
- An interactive model for determining the utility of various land mobile interservice - sharing proposals;
- On the optimal assignment of users to land mobile channels;
- Interference prediction model;
- Computer benchmark implementation and timing for the interference prediction model;
- Computer organization for culling;
- Evaluation of the computer time required to select a frequency;
- Preprocess culling for the interference computer program.

PB-244 899/1CP PC **A09**/MF **A01**
Rockwell International Corp., Cedar Rapids, Iowa. Telecommunications Div.
Research and Development Contract for Coal Mine Communication System. Volume 3. Theoretical Data Base
Final rept.
William C. Laubengayer, K. Michael Ware, Robert D. Gehring, Larry R. Wilson, and Ramsey P. Decker. Nov 74, 190p* BuMines-OFR-69-3-75
Contract H023056
Paper copy also available in set of 4 reports as PB-244 896-SET, PC E99.

Descriptors: *Telecommunication, *Coal mines, *Radio transmission, Extremely low frequencies, Very low frequencies, Low frequencies, Predictions, Signal to noise ratio, Computer programs, FORTRAN.

Volume 3 contains all information used in predicting the performance of low frequency transmissions in through-the-earth systems, along with the predictions themselves for typical situations.

PB-248 856/7CP PC **A09**/MF **A01**
Office of Telecommunications, Boulder, Colo. Inst. for Telecommunication Sciences.
A Versatile Three-Dimensional Ray Tracing Computer Program for Radio Waves in the Ionosphere
Technical rept.
R. Michael Jones, and Judith J. Stephenson. Oct 75, 195p Rept no. OTR-75-76

Descriptors: *Ionospheric propagation, *Ray tracing, *Computer programs, Radio transmission, FORTRAN, Partial differential equations, Numerical integration.
Identifiers: CDC 3800 computers.

This report describes an accurate, versatile FORTRAN computer program for tracing rays through an anisotropic medium whose index of refraction varies continuously in three dimensions. Although developed to calculate the propagation of radio waves in the ionosphere, the program can be easily modified to do other types of ray tracing because of its organization into subroutine. The program can represent the refractive index by either the Appleton-Hartree or the Sen-Wyller formula, and has several ionospheric models for electron density perturbations to the electron density (irregulrities), the earth's magnetic field and electron collision frequency. For each path, the program can calculate group path length, phase path length, absorption, Doppler shift due to a time-varying ionosphere, and geometrical path length. In addition to printing these parameters and the direction of the wave normal at various points along the ray path, the program can plot the projection of the ray path on any vertical plane or on the ground and punch the main characteristics of each ray path on cards. The documentation includes equations, flow charts, program listings with comments, definitions of program variables, deck set-ups, description of input and output, and a sample case.

PB-249 144/7CP PC **A03**/MF **A01**
Federal Communications Commission, Washington, D.C. Research and Standards Div.
Field Strength Calculation for TV and FM Broadcasting (Computer Program TVFMFS)
Gary S. Kalagian. Jan 76, 48p Rept no. FCC/OCE/RS76-01

Descriptors: *Radio broadcasting, *Television broadcasting, *Computer programs, Frequency modulation, Field strength, FORTRAN, Radio transmission, Terrain.
Identifiers: FORTRAN 5 programming language, TVFMFS computer program, UNIVAC 1106 computers.

This program is a computer version of the TV and FM field strength curves found in figures 17, 18, 19, 20, 29 and 30 of FCC Report R-6602. These curves have been adopted in Part 73 of the FCC rules and regulations, effective August 1, 1975. Output options include (1) field strength verses distance, (2) distances to the grade A and B contours, and (3) distance to any given field strength value, based upon input of station power, antenna height above average terrain, frequency, and terrain roughness factor. The computed values of field strength are well within plus or minus 5 dB of the corresponding curve values. The computed distances to various contours are within plus or minus 25 miles of the distances calculated from the curves. The program is written in FORTRAN V for use on a UNIVAC 1106 computer.

PB-250 763/0CP CP **T05**
Lane County Government, Eugene, Oreg. USAC Project.
The Telecommunication/Data Management System (TCDMS) IBM Assembler Language Computer System Magnetic Tape, Release No. 2
Software
Bill Hoyt. Feb 76, 1 reel mag tap HUD/DF-76/003
Contract HUD-H-2073
Supersedes PB-246 335.
Source tape is in EBCDIC character set and certain fields contain packed decimal data. Character set restricts preparation in 9 track one-half inch tape only. Identify recording mode by specifying density only. Call NTIS Computer Products if you have questions. Documentation available.

Descriptors: *Software, *Local government, *Telecommunication, *Information systems, Communications management, Computer programs, Oregon, Magnetic tapes, Counties, Man machine systems, Assembly languages.
Identifiers: USAC project, Lane County(Oregon), Integrated municipal information systems, IBM-360 computers, IBM-370 computers.

This file contains Release No. 2 of the USAC Municipal Telecommunications Data Management System (TCDMS) module of the Lane County Integrated Municipal Information System (IMIS). The purpose of the module is to act as an interface between the IBM computer operating system and application programmers and/or terminal operators.

PB-250 992/5CP PC **A03**/MF **A01**
Lane County Government, Eugene, Oreg. USAC Project.
TCDMS Utilities Manual (Data Management Section)
Special technical rept.
30 Jan 76, 39p Rept no. USAC-LCG2-0015
Contract HUD-H-2073
Prepared in cooperation with Data Processing Authority, Portland, Oreg.

Descriptors: *Local government, *Information systems, *Telecommunication, *Data processing systems, Computer programs, Counties, Oregon, Information retrieval, Manuals, Management planning.
Identifiers: USAC project, Lane County(Oregon), Municipal information systems, Telecommunications data management systems.

This manual is from a USAC series produced by the Regional Information Systems Department of Lane County. It contains a description of the batch utilities available with the Data Management Component of the Telecommunications Data Management System.

PB-251 129/3CP CP **T03**
Federal Communications Commission, Washington, D.C. Research and Standards Div.
TV and FM Broadcasting Field Strength (TVFMFS) Computer Program
Software
Gary S. Kalagian, and Jack M. Linthicum. Feb 76, 1 reel mag tape FCC/OCE/RS76-02, FCC/DF-76/002
Source tape is in EBCDIC character set. Tape can be prepared in most standard 7 or 9 track recording modes for one-half inch tape. Identify recording mode desired by specifying character set, track, density, and parity. Call NTIS Computer Products if you have questions. Price includes documentation, PB-249 144.

Descriptors: *Software, *Radio broadcasting, *Television broadcasting, *Computer programs, FORTRAN, Frequency modulation, Field strength, Radio transmission, Magnetic tapes.
Identifiers: FORTRAN 5 programming language, UNIVAC 1106 computers, TVFMFS computer program.

This program is a computer version of the TV and FM Broadcasting field strength curves found in part 73 of the Federal Communications Commission's Rules and Regulations. The magnetic tape containing this program contains three files: The main program, a curve fitting subroutine, and a test deck....Software Description: The program is written in the FORTRAN V programming language for implementation on a UNIVAC 1106 computer.

PB-251 845/4CP PC **A09**/MF **A01**
National Bureau of Standards, Washington, D.C.

A Contribution to Computer Typesetting Techniques: Tables of Coordinates for Hershey's Repertory of Occidental Type Fonts and Graphic Symbols
Special pub.
Norman M. Wolcott, and Joseph Hilsenrath. Apr 76, 176p* Rept no. NBS-SP-424
Library of Congress Catalog Card No. 75-619219.

Descriptors: *Composing, *Computer graphics, *Plotters, Typography, Computer programs, Tables(Data).
Identifiers: *Typesetting, Computer applications, *Computer output microfilm.

These tables present coordinates from which it is possible to generate 1377 different alphabetic and graphic characters on either COM devices or on digital plotters. The tables, originally developed by Dr. A. V. Hershey of the Naval Weapons Laboratory, are augmented here by corresponding figures which show for each character the location of the tabulated points and the manner in which they are connected. The tables can be used with existing typographic systems to compose pages for scientific and mathematical publications of graphic arts quality either on COM devices or flat-bed plotters. Numerous applications are discussed and illustrated. The tables are also available on a magnetic tape in either BCD or ASCII format from the National Technical Information Service.

PB-251 961/9CP PC **A04**/MF **A01**
Office of Telecommunications, Boulder, Colo. Inst. for Telecommunication Sciences.
Performance of Digital Modems with Cochannel Interference and Gaussian Noise
John R. Juroshek. Feb 76, 63p* Rept no. OTR-76-82

Descriptors: *Modems, Digital systems, Performance, Errors, Phase shift keying, Electromagnetic interference, Random noise, Monte Carlo method, Computer programs, FORTRAN.
Identifiers: Differential phase shift keying.

An approximate method for estimating the performance of digital systems operating with cochannel interference and Gaussian additive noise is described. The method uses Monte-Carlo techniques and an approximation, based on the geometrical characterization of signals, to estimate the error rate of a variety of digital systems as a function of signal-to-noise ratio and signal-to-interference ratio. Curves are presented that show excellent agreement between the estimates and theoretical predictions at symbol and bit error rates as low as 10 to the minus 9 power. Computer programs are included that estimate error rate for multiphase coherent phase-shift keyed (CPSK), noncoherent frequency-shift keyed (NCFSK), differentially coherent phase-shift keyed (DCPSK), and coherent amplitude-phase-shift keyed (CAPK) systems. The programs can handle single as well as multiple cochannel interference, and examples are given that show error rate in both environments.

PB-252 184/7CP PC **A03**/MF **A01**
Office of Telecommunications, Boulder, Colo. Inst. for Telecommunication Sciences.
Analysis of a Digital Telecommunications Message Model
Martin Miles. Apr 75, 45p USPS-1702-111

Descriptors: *Pulse communication, Digital systems, Mathematical models, Binary digits, Signal processing, Telecommunication, Computer programs, Probability density functions, Statistical distributions.
Identifiers: Message processing.

The general expression for the probability density function of the number of bits in a telecommunications message is derived. Some key random phenomena are assumed to have the normal distribution, and their distribution parameters are assigned plausible values. The expressions for the mean and standard deviation of bits per message are derived. The number of pages/message is assumed to have the Poisson distribution truncated at zero, and the resulting distribution is examined.

PB-252 484/1CP PC **A05**/MF **A01**
Marquette Univ., Milwaukee, Wis. Dept. of Electrical Engineering.
The Design and Testing of a System for Formant Tracking of Voiced Speech
Final rept.
Roger M. Vilmur, and Russell J. Niederjohn. Sep 75, 79p Rept no. EE-75-3
Grant NSF-GK-37454

Descriptors: *Speech recognition, *Speech analysis, *Speech therapy, Frequency analyzers, Bandpass filters, Phonology, Computer programs, FORTRAN, Algorithms, Spectrum analysis, Circuits.
Identifiers: *Formant analysis.

The development and testing of an automatic system for tracking the first three formant frequencies in speech recognition is described. The method used involves both a frequency-domain analysis and a time-domain analysis. A rough frequency domain analysis is performed with a bank of fixed bandpass filters. The amplitude of the signal in each filter is measured. In addition, an accurate time-domain analysis is performed using a measure of the consistency of the crossing intervals from each filter. The acquired data is then used in a computer algorithm to determine the formant frequencies. A description and operation of all hardware and software components is included.

PB-252 688/7CP PC **A05**/MF **A01**
Office of Telecommunications, Boulder, Colo. Inst. for Telecommunication Sciences.
A Numerical Method for Generating Earth Coverage Footprints from Geostationary Antennas
Randy H. Ott. May 75, 83p USPS-1702-112

Descriptors: *Communications satellites, *Antenna radiation patterns, Telecommunication, Spacecraft antennas, Synchronous satellites, Power spectra, Algorithms, Computer programs.
Identifiers: Electronic message system.

An algorithm is described for generating on a microfilm out-put earth coverage footprints from geostationary satellite antennas. A separate algorithm for determining whether given stations are included in or excluded from a particular footprint is described. The antenna beam can be elliptic in cross-section with an arbitrary orientation of semiminor and semi-major axes. Several examples of the use of the algorithms are presented.

PB-258 556/0CP PC **A08**/MF **A01**
Office of Telecommunications, Boulder, Colo. Inst. for Telecommunication Sciences.
Predicting the Performance of High Frequency Sky-Wave Telecommunication Systems (the Use of the HFMUFES 4 Program)
George W. Haydon, Margo Leftin, and Rayner K. Rosich. Sep 76, 165p Rept no. OTR-76-102

Descriptors: *Ionospheric propagation, High frequencies, Radio transmission, Forecasting, Radio communication, Punched cards, Predictions.
Identifiers: HFMUFES 4 computer program.

The report describes the input information required and the outputs available from the latest version of the OT/ITS high-frequency sky-wave system performance prediction program (HFMUFES 4). Input requirements and typical output formats are described including their application in the planning and operation of high frequency communication systems using sky waves. The report stresses the mechanics of using HFMUFES 4 or its output rather than the theoretical aspects of the prediction method. The report is directed primarily toward new users of HF sky-wave predictions. Planned improvements in the predictions, expected benefits from these improvements and progress toward these improvements are a part of the report.

PB-258 737/6CP PC **A05**/MF **A01**
Federal Communications Commission, Washington, D.C. Research and Standards Div.
Satellite System Interference Modeling (11.7-12.2 GHz)
S. Das, and George Sharp. Sep 76, 83p Rept no. FCC/OCE/RS76-04

Descriptors: *Communication satellites, *Radiofrequency interference, Networks, Computerized simulation, Computer programs, Superhigh frequencies, Microwave relay systems.
Identifiers: Communication networks.

This report presents the analysis and results of a modeling technique to calculate the interference of a satellite network in the presence of other satellite networks. Five specific cases are reported: 81 satellites placed in (a) four homogeneous blocks, (b) seven homogeneous groups, (c) somewhat inhomogeneous groups (two cases), and 60 highly constrained or structured satellites. As the inhomogeneity increases, it becomes more difficult to obtain an optimum orbital separation between the satellites.

PB-260 426/2CP CP **T05**
Federal Communications Commission, Washington, D.C. Broadcast Bureau.
RADIAT Computer Program
Software
John Boursy, and Bill Lannin. Oct 76, mag tape*
FCC/DF-76/008
Source tape is in EBCDIC character set. Tape(s) can be prepared in most standard 7 or 9 track recording modes for one-half inch tape. Identify recording mode desired by specifying character set, tract, density, and parity. Call NTIS Computer Products if you have questions. Price includes documentation, PB-260 427.

Descriptors: *Software, *Antenna radiation patterns, *Radio broadcasting, *Radio stations, *Computer programs, *Directional antennas, Amplitude modulation, Computations, FORTRAN, Magnetic tapes.
Identifiers: RADIAT computer program, FORTRAN 5 programming language.

Radiation patterns are calculated for standard broadcast (AM) stations, including theoretical, standard, modified standard, stability and reradiation patterns. Also, included are related calculations such as RMS studies, nearfield studies, and computation of mutual impedances. Results of some intermediate calculations may also be printed. Limitations - maximum of 20 towers + 50 augmentations; both can be easily changed. Known error - incorrect results for modified standard (augmented) pattern special angles will result if the first vertical angle is not on the horizontal. The program is written in the FORTRAN V programming language for implementation on a Honeywell 6023 computer using the GCOS operating system. 168K bytes of storage are required to operate the program.

PB-260 427/0CP PC **A05**/MF **A01**
Federal Communications Commission, Washington, D.C. Broadcast Bureau.
A User's Guide to RADIAT, CONTOUR, CLIPPING, SKYWAVE
Final rept.
John Boursy. 25 Apr 75, 81p* FCC/DF-76/008a
For system on magnetic tape, see PB-260 426.

Descriptors: *Instructions, *Computer programming, *Radio broadcasting, Directional antennas, Antenna radiation patterns, Ionospheric propagation, Radio waves, Radiofrequency interference, Amplitude modulation.
Identifiers: RADIAT computer program, CONTOUR computer program, CLIPPING computer program, SKYWAVE computer program.

This is a user's guide for four FORTRAN computer programs used in FCC's broadcast bureau. RADIAT is used for standard broadcast (AM) directional antenna calculations. CONTOUR is used for distance, bearing, midpoint latitude and Skywave field factor calculations. CLIPPING is used for 'clipping' studies for nighttime standard broadcast (AM) interference studies. SKYWAVE is used to calculate the extent of 10% and 50% nighttime Skywave contours for standard broadcast (AM) stations.

PB-261 229/9CP PC **A07**/MF **A01**
Office of Telecommunications, Annapolis, Md.

An Automated Procedure for Predicting Potential Electromagnetic Interference between Space and Terrestrial Systems Within the Coordination Areas in the Bands between 7.25 and 8.4 GHz
Technical rept.
William M. Moran, Carl Winkler, and William Gamble. Aug 76, 135p Rept no. OTR-76-100

Descriptors: *Microwave communication, *Electromagnetic compatibility, *Radiofrequency interference, *Computer programs, Microwave relay systems, Communication satellites, MW line of sight communication, Predicting, Antennas.
Identifiers: Ground stations, X band.

A computer program has been developed which is designed to identify potential electromagnetic interference problems between a satellite system earth station and the operational terrestrial environment within the earth station coordination contour. The terrestrial environment is obtained by selecting from the GMF records of those systems which share the same frequency band (7.25-8.4 GHz) as the earth station and are located within the coordination area as defined in the ITU Radio Regulations. The output of this computer program is a subfile of those situations which appear to be a potential EMC problem.

PB-264 519/0CP PC **A05**/MF **A01**
Office of Telecommunications, Boulder, Colo. Inst. for Telecommunication Sciences.
An Automated Technique for Calculating Interference from Airborne Transmitters to Terrestrial Receivers
Technical memo.
John K. Wheeler, and Eldon J. Haakinson. Feb 77, 82p* Rept no. OTR-77-110

Descriptors: *Radiofrequency interference, Microwave communication, Computation, Computer programming.
Identifiers: ATTIC computer program, Ground stations.

A computer program (ATTIC) has been developed with the ability to automatically compute and plot interference contours around existing microwave systems when new airborne systems are proposed or planned. The frequency manager or spectrum analyst can utilize ATTIC to vary the airborne system parameters and examine the size of the interference contours. The ATTIC program implements a procedure for determining the level of interference generated in a terrestrial microwave terminal (or system of microwave terminals) by an airborne telecommunication system. The output of this procedure is a set of contours defining those aircraft positions which produce a constant signal-to-interference (S/I) ratio to the terrestrial systems being analyzed. The S/I contours are plotted on a map with U.S. state boundaries. The user supplies the basic aircraft data while the terrestrial receiver(s) data are obtained from a computer accessible data base. Although program flow and program limitations will be discussed in this report, emphasis is on implementing ATTIC, interpreting the output, and presenting sample analyses.

PB-266 790/5CP CP **T10**
National Technical Information Service, Springfield, Va.
Convert Ebcdic Photon Typesetter Drive Tapes to Tts Code.
Software.
5 May 76, mag tape SW-15FP27J, NTIS/DF-77/005
Source tape is in EBCDIC character set. Tape(s) can be prepared in most standard 7 or 9 track recording modes for one-half inch tape. Identify recording mode desired by specifying character set, track, density, and parity. Call NTIS Computer Products if you have questions.

Descriptors: *Phototypesetting, *Software, *Computer programs, *Photocomposition, *Photon Pacesetter Mark 2, Composing, Text editing, Magnetic tapes.
Identifiers: IBM 360/40 computers, Operating system = EDOS, Software type = Computer program, Batch processing mode, System application = Bibliographic/textual, ALC programming language, Computer memories = 3k byte, Program statements = 138, Tape drives = one.

This program converts files containing text data and the appropriate typesetting control codes from EBCDIC to Teletypesetter (TTS) eight-level code for subsequent photocomposition by the Photon Pacesetter Mark 2.

PB-267 777/1CP PC **A08**/MF **A01**
Office of Telecommunications, Boulder, Colo. Inst. for Telecommunication Sciences.
Confidence Limits for Digital Error Rates from Dependent Transmissions
Edwin L. Crow, and Martin J. Miles. Mar 77, 156p Rept no. OTR-77-118

Descriptors: *Pulse communication, *Confidence limits, *Errors, Probability density functions, Approximation, Chi square test, Markov chains, Monte Carlo method, Statistical tests, Reliability, Distribution functions, Computer programs.
Identifiers: Bernoulli trials, Edgeworth series, Likelihood ratio test, Pearson type density functions.

Approximate confidence limits for error rates (probabilities of an error) of digital communication systems are derived under the assumptions that the sample is large, the error rate is constant and the dependence between transmissions is governed by a stationary first-order Markov chain model. Five different approximations are given: normal distribution, Edgeworth two-term and four-term, Pearson system, and modified Poisson-Anderson-Burstein. Results by Gabriel and by Klotz are used. The limits are compared with Ladd's small-sample limits and illustrated on telephone data. Methods for testing the validity of the model are described. A computer program for applying the limits is presented, and an extensive Monte Carlo simulation to test the accuracy of the limits is summarized. Methods for designing the experiment so as to achieve a specified precision are given.

PB-267 953/8CP PC **A05**/MF **A01**
Office of Telecommunications, Boulder, Colo. Inst. of Telecommunication Sciences.
Automated Computing and Plotting of Geostationary Satellite Earth Footprints: Program Footprints User's Manual
Technical rept.
E. J. Haakinson, K. P. Spies, D. E. Skinner, and G. J. Bridgewater. Apr 77, 96p Rept no. OTR-77-120

Descriptors: *Communication satellites, *Antenna radiation patterns, *Programming manuals, Spacecraft antennas, Synchronous satellites, Gain, Computerized simulation, Fortran, Plotting, Radio field strength, Computation, Regulations, Communications management.
Identifiers: Fortran 5 programming language, *Earth footprints, FOOTPRINTS computer program, UNIVAC 1108 computers.

Earth footprints are contours of constant antenna gain from antennas aboard geostationary satellites. Footprint plots are used by design engineers as an aid in maximizing satellite antenna coverage over a particular portion of the earth's surface while minimizing the effects of interference to other telecommunication systems. Similarly, the plots aid international regulatory bodies in coordinating deployment of satellite systems so as to minimize interference. A computer program was written that automatically computes and plots footprints. The program is flexibly designed to accommodate a broad range of user-supplied input details, from minimal information to highly detailed antenna pattern data. It is written in UNIVAC Fortran V language for use in an interactive (time-sharing) mode on the UNIVAC 1108 computer. The manual explains the execution of the program, the choice of input values, the alteration of input values, and the interpretation of output results. Sample executions of the program also are provided.

PB-268 027/0CP PC **A03**/MF **A01**
Office of Telecommunications, Boulder, Colo. Inst. for Telecommunication Sciences.
Power and Beam Pointing Restrictions for Geostationary Orbit Avoidance: Program ORBITCHECK User's Manual
Technical rept.
E. J. Haakinson, and D. E. Skinner. Apr 77, 48p Rept no. OTR-77-119

Descriptors: *Communication satellites, *Radiofrequency interference, *Telecommunication, *Programming manuals, Radio stations, Radiofrequency power, Radio beams, Electromagnetic compatibility, Regulations, Monitoring, Communications management.
Identifiers: Computer applications, Fortran 5 programming language, *Radiofrequency management, ORBITCHECK computer program, Ground stations, UNIVAC 1108 computers.

Internationally established power and antenna beam pointing restrictions have been placed on fixed and mobile terrestrial systems which share common frequency bands with geostationary satellites. The restrictions were designed to limit the level of in-band and/or adjacent-channel interference power from the terrestrial system to the space systems. A computer program has been developed to automatically check the compliance of fixed terrestrial stations with the stated requirements. Specifically, the program checks frequency applications and assignments against the regulation stated in Section 8.2.34 of the Office of Telecommunications Policy's Manual of Regulations and Procedures for Frequency Management, and Article 7 Section VII of the International Telecommunication Union's Radio Regulations. It is written in UNIVAC Fortran V language for use in an interactive (time-sharing) mode on the UNIVAC 1108 computer. This manual explains the execution of the program, the choice of input values, the alteration of input values, and the interpretation of output results. Sample executions of the program are also provided.

PB-271 320/4CP PC **A05**/MF **A01**
Farmers Home Administration, Washington, D. C.
MERTL (Multidrop Efficiency Regarding Transmission Lines)
Final rept.
Alan L. Loewen, and Robert L. Miller. May 77, 80p Rept no. TELOCOMM MEMO-9-01-77
Library of Congress catalog card no. 77-8876.

Descriptors: *Transmission lines, *Data transmission, *Computerized simulation, Computer programs, COBOL, Telecommunication, Traffic, Network analysis(Management), Performance, Efficiency.
Identifiers: MERTL computer program, Multidrop transmission lines, Ansi Cobol programming language, Communications traffic, Communications networks.

The MERTL simulator is an input transaction driven computer program written in ANS COBOL and currently implemented for Burroughs Medium Systems computers and for IBM 370 Systems. It is capable of simulating a wide variety of polled multidrop line environments and transaction loads. In its present form it is most appropriate for an application in which the transaction input load and characteristics are well defined.

PB-271 815/3CP PC **A05**/MF **A01**
Office of Telecommunications, Boulder, Colo. Inst. for Telecommunication Sciences.
A Program Description of 'Orbit - Prints': Contours of Power Density at the Geostationary Orbit
W. A. Kissick, and D. N. Rebol. Jun 77, 95p Rept no. OTR-77-126

Descriptors: *Radio transmission, *Computer programs, *Spectral energy distribution, Radio field strength, Power spectra, Antenna radiation patterns, Fortran, Radio stations, Synchronous satellites.
Identifiers: Fortran 4 programming language, Communication terminals, ORBITPR computer program.

The report describes a computer program which calculates the contours of terrestrial-emitter power density measured at or near the geostationary orbit. The program calculates the power density for an array of points located on the inside surface of a sphere described by the geostationary orbit. The theory and calculations used assume free-space propagation. The geometry allows for arbitrary aiming of the emitter antenna, and several antenna patterns for the terrestrial emitters are included as subroutines of the computer program. The primary output of the program is a computerized plot of contour intervals of power density. The program was written in Fortran IV for the U.S. Department of Commerce, Boulder Laboratories' computer. Flow charts and program listings are included in the report.

PB-274 533/9CP PC **A03**/MF **A01**
Wisconsin Univ.-Madison. Dept. of Electrical and Computer Engineering.
Quantization of Image Transforms with Minimum Distortion
Final rept.
George H. Senge. May 77, 45p Rept no. ECE-77-8
Grant NSF-ENG75-10545

Descriptors: *Image processing, *Data compression, *Fourier transformation, Data transmission, Coding, Decoding, Distortion, Computer programs, Partial differential equations, Probability density functions, Holography, Computation.
Identifiers: Quantization, Rayleigh density functions.

In computer holography and image processing there is often a need to quantize a complex gaussian random variable by magnitude and phase angle. But there has not yet appeared in publication the exact minimum mean squared error range and quantization levels for the Rayleigh magnitude distribution. The report contains a numerical solution for these levels which is very fast and accurate. The levels and distortion are listed as a function of the number of levels for the Rayleigh distribution. The algorithm can be used for quantizing a random variable of any arbitrary distribution.

PB-274 683/2CP PC **A05**/MF **A01**
Pennsylvania State Univ., State College. Environmental Acoustics Lab.
Evaluation of Experimental and Developmental Communication Systems Used in Underground Coal Mines. Performance of Trapped-Miner Communication System
Final rept. 1 Apr 76-31 Jan 77
Paul L. Michael, and James H. Prout. Feb 77, 87p BuMines-OFR-165-77
Grant G0166120

Descriptors: *Telecommunication, *Coal mines, *Rescue operations, Underground mining, Speech, Computer programs, Computerized simulation, Evaluation, Intelligibility.
Identifiers: Mine communication systems, Trapped miners.

Several evaluations were made by modified rhyme test (MRT) word lists transmitted through various simulations of the trapped-miner system being developed by the Federal Bureau of Mines. The tests were performed in a 'single blind' situation so that the evaluators would not be biased by knowing the characteristics of the system being simulated. A computer program was developed to provide a simulation of the electrical aspects of the communication system and to provide an evaluation by calculation of the articulation index (AI). The study indicates that communication through the presently proposed system will be somewhat unreliable at depths as great as 300 meters even with the system operating at maximum efficiency.

PB-276 611/1CP PC **A09**/MF **A01**
Advanced Research Resources Organization, Silver Spring, Md.
Implementation of User Demand and Satisfaction Model for Personal Radio Services
Final rept.
Barry E. Goodstadt, Alan P. Romanczuk, and Philip C. Burger. Dec 77, 188p* FCC/DF-78/002a
Contract FCC-0223
For data file on magnetic tape, see PB-276 610.

Descriptors: *Radio communication, *Market research, *Frequency allocations, Economic models, Communications management, Demand(Economics), High frequencies, Forecasting, Utilization, Computer programs.
Identifiers: *Citizens band radio, Spectrum management.

An earlier report (FCC/OPP PRPG 77-01, PB 266 115) described the conceptual development of the forecasting model and the design of questionnaires and survey sampling procedures for examining user satisfaction and demand for personal radio services. This report focuses on the implementation of the survey, the analysis of survey data underlying model development, and the forecasting results derived from simulating several alternative scenarios for future personal radio service configurations. The study consisted of two main components: Personal interviews with nonusers of CB radios, 16 and older; and telephone interviews with past and present users of CB radios, 16 and older. A total sample consisted of 1,304 persons, 630 present users of CB radio, 124 past users, and 550 nonusers. Response to the study questions provided the basis of a computerized forecast of user demand and satisfaction over a ten year period, assuming no change in the present CB configuration at 27MHz, and an assessment of future demand and satisfaction with simulated alternative configurations over the same period.

PB-279 939/3CP PC **A04**/MF **A01**
National Bureau of Standards, Washington, D.C. Inst. for Computer Sciences and Technology.
Computer Science and Technology: FORTRAN IV Enhanced Character Graphics
Norman M. Wolcott. Apr 78, 60p* Rept no. NBS-SP-500-32
Library of Congress Catalog Card no. 78-606027.

Descriptors: *Computer graphics, *Computer programs, Plotting, Composing, Forts, Alphabets, Symbols, Automation.
Identifiers: *Typesetting, *Alphanumeric symbols, *Computer aided typesetting, *Typography, Computer output microfilm, Fortran 4 programming language, Fortran 5 programming language, Univac 1108 computers, Univac 1110 computers, IBM-360 computers, IBM-370 computers, PDP-10 computers, PDP-11 computers.

A FORTRAN IV subroutine is described which allows the drawing of six styles of alphabetic characters, three styles of numbers, and 48 special mathematical symbols from the enhanced graphic character set of Dr. A.V. Hershey. Twenty-two symbols for graph plotting are also provided. Output is by linkage to an external subroutine PLOT. The program requires a computer which can accommodate a 30 bit word-length.

PB-284 589/9CP Not available NTIS
National Engineering Lab. (NBS), Boulder, Colo. Electromagnetic Fields Div.
Earth Terminal Measurement System Operations Manual
David F. Wait. Apr 78, 266p Rept no. NBSIR-78-879
Paper copy available from David R. Wait, Electromagnetic Fields Div., Radio Building, Room 4085, National Bureau of Standards, Boulder, Colo. 80303.

Descriptors: *Radio relay systems, *Manuals, Measurement, Communication satellites, Radiofrequency power, Computer programs, Performance evaluation.
Identifiers: Earth Terminal Measurement System, *Communication satellite terminals, Ground stations, Noise temperature.

The Earth Terminal Measurement System (ETMS) was developed by the National Bureau of Standards to make accurate measurements of earth terminal and satellite parameters such as figure of merit (G/T), antenna gain relative to a reproducible reference level, satellite effective isotropic radiated power (EIRP), and ratio of carrier power to the operating noise temperature (C/kT). Because of difficulties of using the standard earth terminal parameters to precisely characterize the earth terminal, the parameters noise equivalent flux (NEF) and noise ulterior flux (NUF) are introduced. NEF characterizes the earth terminal hardware, and it is defined so that it is largely independent of frequency and antenna elevation angle. Thus, it is easier to evaluate the 'reasonableness' of a particular set of results in light of the other results taken at various frequencies and elevation angles. This manual includes the theory of the measurements, measurement procedures, measurement troubleshooting, interpretation of the results, and a discussion of the ETMS software.

PB-286 162/3CP PC **A09**/MF **A01**
Stanford Univ., CA. Communications Satellite Planning Center.
A Demand Assignment Multiple Access (DAMA) Control System for Thin-Route Satellite Telephone Systems
Technical rept.
M. J. Sites, B. B. Lusignan, Warren Tan, Simon Chu, and James Swytu. Dec 76, 194p Rept no. TR-10

Descriptors: *Controllers, *Telephone systems, *Radio relay systems, Communication satellites, Telecommunication, Routing, Executive routines, Assembly languages, Computer programs.
Identifiers: Satellite networks, Multiple access, Communication satellite terminals, Microprocessors, Message processing, Computer applications, DAMA system.

A review of alternative approaches to Demand Assigned Multiple Access (DAMA) controllers is given. These controllers route telephone calls between different ground stations in a communications satellite network. The approach recommended uses a random access signaling channel with low data rate signaling and microprocessors at each station. The control system would cost less than $4000 per station. The system controls over 500 simultaneous calls in the satellite and will work with any number of stations in a network. Detailed microprocessor program flow charts are given for the recommended approach. (Portions of this document are not fully legible)

RT/EL-(74)-6 PC **A03**/MF **A01**
Comitato Nazionale per l'Energia Nucleare, Rome (Italy).
Code for the Detection of Errors for Transmission of Ten-Bit Words.
G. Mantovani, A. Sano, and B. Spataro. Nov 74, 35p
In Italian. U.S. Sales Only.

Descriptors: *Data transmission, *Errors, Computer codes.
Identifiers: ERDA/990200.

For abstract, see NSA 7506

UCID-17375 PC **A03**
California Univ., Livermore. Lawrence Livermore Lab.
AMPS Automated Message Processing System, LER 76-101701A
W. Benge, and J. Spann. 3 Dec 76, 40p
Contract W-7405-ENG-48

Descriptors: *Computer codes, *Computer networks, A codes, Communications, Microprocessors, Operation.
Identifiers: ERDA/990200, Communications networks.

This report describes the operation and use of the LLL Automated Message Processing System (AMPS), which is used for off-line preparation of messages for SACNET (Secure Automatic Communications Network). The preparation of teletype messages before AMPS required typing on a teletype to create a paper tape in ASCII code compatible with SACNET. AMPS uses a MCS-80 microprocessor, CRT with keyboard, and a teletype to create the SACNET messages. Through processor control and CRT edit capabilities, through-put of the system was increased about 50 percent. 11 figures. (ERA citation 02:047041)

UCRL-52080 PC A03/MF A01
California Univ., Livermore. Lawrence Livermore Lab.
Computer Analysis of the Twin-Whip Antenna
G. J. Burke, and A. J. Poggio. 1 Jun 76, 29
Contract W-7405-Eng-48

Descriptors: *Antennas, Communications, Computer codes, Mathematical models, N codes, Numerical analysis, Ships.
Identifiers: ERDA/420200.

Computer techniques are used to analyze the twin-whip, high-frequency, HF communication antenna employed by the U.S. Navy. The antenna is considered both on an infinite ground plane and mounted on a bracket. The program NEC, a modification of the AMP program, was used for the analysis and is very briefly described. Several models of the source region are evaluated, and the results are compared with measured input impedances. A model using a transmission line for the feed region is found to give very accurate results. (ERA citation 02:001264)

SUBJECT INDEX

ACCELERATION
Voice Contro' Systems for Airborne Environments
AD-A043 252/6CP

ACOUSTIC DATA
Preliminary Reference Manual for Program STAMP (STatistics of Acoustic Measurements and Predictions)
AD-A020 742/3CP

ACOUSTIC EQUIPMENT
Speech Understanding Systems. Volume II. Acoustic Front End
AD-A035 166/8CP

ACOUSTIC SIGNALS
The CASPERS Linguistic Analysis System
AD-A016 701/5CP

ADAPTIVE CONTROL SYSTEMS
Definition of Real-Time Adaptive Control (RTAC) of the Defense Satellite Communications System (DSCS). Volume V. Computer Program Description and Development for a Real-Time Adaptive Control Study
AD-A034 509/0CP

ADAPTIVE MULTILEVEL SPEECH CODERS
Adaptive Multilevel 16KB/S Speech Coder
AD-A031 516/8CP

AIR TRAFFIC
Simulation Model for New York Air Traffic Control Communications
AD-A006 426/1CP

AIR TRAFFIC CONTROL
Gospre: A Simple Analytical Program for Computing Grade of Service in a Heavily Loaded Communications Network.
N75-29301/9CP

AIR TRAFFIC CONTROL SYSTEMS
Simulation Model for New York Air Traffic Control Communications
AD-A006 426/1CP

Air Traffic Control Experimentation and Evaluation with the NASA ATS-6 Satellite. Volume II. Demonstration of Satellite-Supported Communications and Surveillance for Oceanic Air Traffic Control
AD-A042 146/1CP

Simulation Model for Air Traffic Control Communications
AD-A044 256/6CP

Development of a Discrete Address Beacon System
AD-A046 580/7CP

Automated UHF Frequency Assignment System for FAA Air Traffic Control Communications
AD-A047 847/9CP

FAA Remote Terminal System
AD-A054 604/4CP

Pennsylvania-Princeton Army Avionics Research Program. Army Aircraft Communication Task
AD-738 178/CP

An Automated FAA Frequency Assignment System
AD-779 086/8CP

AIRBORNE/SPACEBORNE COMPUTERS
Astronaut/Computer Communication Study Final Report
N71-25922/CP

AIRCRAFT COMMUNICATION
Gospre: A Simple Analytical Program for Computing Grade of Service in a Heavily Loaded Communications Network.
N75-29301/9CP

ALPHANUMERIC SYMBOLS
Computer Science and Technology: FORTRAN IV Enhanced Character Graphics
PB-279 939/3CP

AN/TGC-26
Modification of the AN/TGC-26 Multiple Address Processing Unit to Accept JANAP 128 Format
AD-A039 720/8CP

ANTENNA ARRAYS
Experimental Validation of the Antenna Pattern Distortion Computer Program (VHF Antenna)
AD-A049 740/4CP

Phased Array Antenna Amplifier Exploratory Development Model (100 watts)
AD-A056 173/8CP

Recursive Algorithms for Adaptive Array Antennas
AD-778 947/2CP

ANTENNA RADIATION PATTERNS
Antenna Pattern Distortion Computer Program
AD-A038 142/6CP

Experimental Validation of the Antenna Pattern Distortion Computer Program (VHF Antenna)
AD-A049 740/4CP

Antenna Pattern Distortion Computer Program
AD-767 906/1CP

A Numerical Method for Generating Earth Coverage Footprints from Geostationary Antennas
PB-252 688/7CP

RADIAT Computer Program
PB-260 426/2CP

Automated Computing and Plotting of Geostationary Satellite Earth Footprints: Program Footprints User's Manual
PB-267 953/8CP

ANTENNAS
Antenna Pattern Distortion Computer Program
AD-A038 142/6CP

Antenna Selection for Ionospheric Telecommunication Systems
AD-A049 549/9CP

Energy Spectra for Frequency-Shift-Keyed Signals Transmitted by Synchronously Resonated, Very Low Frequency Antennas
AD-777 268/4CP

Computer Analysis of the Twin-Whip Antenna
UCRL-52080

APOLLO PROJECT
Study of Potential Applications of Digital Techniques to the APOLLO Unified S-Band Communications System, Phase 2 Final Report
N71-21465/CP

A Model for Calculating Expected Performance of the APOLLO Unified S-Band (Usb) Communication System
N72-18159/CP

ARMY AIRCRAFT
Pennsylvania-Princeton Army Avionics Research Program. Army Aircraft Communication Task
AD-738 178/CP

ARMY OPERATIONS
Communications Support Requirements (COMSR) Study. Volume 8, Appendix C
AD-778 237/8CP

ARPA COMPUTER NETWORK
ARPA Policy-Formulation Interrogation Network
AD-A002 489/3CP

ARPA Internetwork Protocols Project Status Report
AD-A024 819/5CP

Single-Connection TCP Specification (Preliminary Documentation)
AD-A024 820/3CP

TELNET under Single-Connection TCP Specification
AD-A024 821/1CP

TCP Resynchronization
AD-A024 822/9CP

ARPA Internetwork Protocols Project Status Report
AD-A024 823/7CP

The Interface Message Processor Program
AD-A025 358/3CP

The ARPANET Network Control Center Program
AD-A033 351/8CP

The ARPANET/TENEX Primer and the MSG Message Handling Program
AD-A042 740/1CP

University College London ARPANET Project
AD-A044 419/0CP

A Research Program in Computer Technology
AD-A045 673/1CP

The Network Control Center Program
AD-786 134/7CP

ARTIFICIAL SATELLITES
The ROSCOE Manual. Volume 20 - Satellite Communication Model
AD-A047 918/8CP

Structured Analysis and Design of a Satellite Simulator
AD-A055 192/9CP

A Computer Program for Evaluating Radio Signal Propagation from Artificial Earth Satellites.
N70-27491/CP

ATMOSPHERIC ATTENUATION
Precipitation Variability in the U. S. A. For Microwave Terrestrial System Design
AD-A049 041/7CP

ATMOSPHERIC SCATTERING
Computer Software for EWCS Performance Prediction
AD-A049 211/6CP

ATMOSPHERIC SOUNDING
Project SECEDE. Tracking Barium releases using the TV-TRACK System
AD-731 574/CP

ATMOSPHERIC TURBULENCE
Study of Atmospheric Effects on Laser Communications Systems. Volume 2 - Atmospheric Effects on Wave Propagation at 10.6 Microns Interim Report
N71-26419/CP

ATS 6
Data Collection Operational Support System, Part 1.
N76-22246/2CP

AUTODIN
SCCU/MCCU Characteristics for Autodin II
AD-A037 214/4CP

Autodin Time Sharing Editor System Program Reports
AD-917 041/6CP

Autodin Time Sharing Editor System Users Manual
AD-917 047/3CP

AVIONICS
Computer Simulation of MUX Bus Voltage Waveforms under Steady State Conditions
AD-A013 107/8CP

B-1 AIRCRAFT
B-1 EMUX Automated Logic Diagrammer Demonstration Program
AD-A056 964/0CP

BEACON SATELLITES
Prediction of Attenuation of the 28 Ghz Comstar Beacon Signal Using Radar and Measured Rain Drop Spectra.
N78-30483/9CP

BEHAVIORAL SCIENCE
Proximity: Location, Time, and Opportunity to Communicate
AD-A011 151/8CP

BINARY CODES
Analysis and Simulation of a Syndrome Decoder for a Constraint Length K Equals 5, Rate R Equals 1/2 Binary Convolutional Code.
N76-16310/4CP

BLAST
Avoidance of Collateral Blast Damage to Increase Survivability of Military Telecommunications Networks
AD-A030 462/6CP

BROADCASTING
Satellite Broadcasting System Study
N72-17111/CP

BUFFER STORAGE
A Computer Program for the Simulation of Store and Forward Telegraph Networks.
N75-33297/3CP

BURST TRANSMISSION
A Microprocessor-Controlled Interface for Burst Processing
AD-A030 226/5CP

BUS CONDUCTORS
Computer Simulation of MUX Bus Voltage Waveforms under Steady State Conditions
AD-A013 107/8CP

The 'Standard' MUX Bus: Some Constraints on Information Flow Arising from MIL-STD-1553 (USAF)
AD-A017 677/6CP

BUSY HOUR MODEL COMPUTER PROGRAMS
Busy Hour Model Program Reports
AD-917 036/6CP

Busy Hour Model User's Manual
AD-917 046/5CP

CALIBRATING
Vlf Receiver Calibration.
N74-19103/2CP

CAMERA TUBES
Intensified Silicon Diode-Array Target TV-Camera Tube (EBSICON); Description and Mathematical Model
AD-A020 994/0CP

CARRIER WAVES
Spectral Analysis Program. Volume 1: User'S Guide
N73-26145/5CP

CATHODE RAY TUBES
Evaluation of the Burroughs 3500 CRT Enhancement Program Communications System
AD-A037 086/6CP

CENTRAL PROCESSING UNITS
ARPA Policy-Formulation Interrogation Network
AD-A002 489/3CP

A Unified Approach to Modelling Loop Service Systems: A Preliminary Report
AD-A021 940/2CP

CHANNEL COMMUNICATIONS
Energy Use for the Autoregressive Channel with Noiseless Feedback: Numerican Study
AD-923 122/6CP

CHANNELS
HF Channel Simulation
AD-A027 429/0CP

CHANNELS (DATA TRANSMISSION)
Performance Analysis of Psk Signals Through Fading Channels.
N77-18320/0CP

CHEMICAL RELEASE STUDIES
Project SECEDE. Tracking Barium releases using the TV-TRACK System
AD-731 574/CP

SUBJECT INDEX

CIRCUIT INTERCONNECTIONS

Single-Connection TCP Specification (Preliminary Documentation)
AD-A024 820/3CP

TELNET under Single-Connection TCP Specification
AD-A024 821/1CP

CIRCUITS

Automatic Speech Level Meter
N73-31402/3CP

CIRCULAR ORBITS

The Quasi-Stationary Satellite Orbit
PB-240 349/1CP

CITIZENS BAND RADIO

Implementation of User Demand and Satisfaction Model for Personal Radio Services
PB-276 611/1CP

CIVIL DEFENSE

Feasibility Model Development of the 61-kHz Subsystem of the Decision Information Distribution System
COM-75-10792/0CP

COAL MINES

Research and Development Contract for Coal Mine Communication System. Volume 3. Theoretical Data Base
PB-244 899/1CP

Evaluation of Experimental and Developmental Communication Systems Used in Underground Coal Mines. Performance of Trapped-Miner Communication System
PB-274 683/2CP

COCHLEA

Early Data from a Real-Time Cochlea
AD-A049 520/0CP

CODERS

Adaptive Multilevel 16KB/S Speech Coder
AD-A031 516/8CP

The Performance of 31 and 127 Bit Elastic Surface Wave Encoders and Decoders
AD-762 910/CP

Space Vehicle Onboard Command Encoder.
N76-18203/9CP

CODING

Speech Digitization Excitation Study
AD-A012 740/7CP

Hardware and Software Error Correction Coding
AD-A017 377/3CP

Voice Input Code Identifier
AD-B006 851/0CP

Analysis of a Pseudo-Noise Addressing System for Multiple Access Communication with Applications of Error-Correcting Codes.
AD-711 001/CP

Entropy Coded Adaptive Differential Pulse Code Modulation Systems for Speech Signals
AD-762 606/CP

Slant Transform Image Coding
AD-767 758/6CP

3-to-1 Data Compression Via Walsh Transform
AD-774 082/2CP

COL PROGRAMMING LANGUAGE

Communications Oriented Language (COL): Language Definition
AD-A047 392/6CP

Communications Oriented Language (COL): Language Implementation and Usage
AD-A047 393/4CP

COLOR TELEVISION

Slant Transform Image Coding
AD-767 758/6CP

COMMAND AND CONTROL

Space Vehicle Onboard Command Encoder.
N76-18203/9CP

COMMAND AND CONTROL SYSTEMS

A Preliminary Cost Analysis of the Communications Processor for the F-15 Joint Tactical Information Distribution System
AD-A027 365/6CP

Instrumentation Development Investigation of Command and Control Console
AD-A029 967/7CP

WWMCCS System 700 Remote Terminal, Test and Diagnostic Software Utilization
AD-A033 092/8CP

WCCM Automated Command and Control Support
AD-A033 559/6CP

Decision Analysis as an Element in an Operational Decision Aiding System (Phase IV)
AD-A045 083/3CP

A Research Program in Computer Technology
AD-A045 673/1CP

Building Blocks for C3 Systems
AD-A052 568/3CP

A Computerized Command and Control System for the Los Angeles City Fire Department
AD-A054 750/5CP

Structured Analysis and Design of a Satellite Simulator
AD-A055 192/9CP

Software Acquisition Management Guidebook: Cost Estimation and Measurement
AD-A055 574/8CP

Software Acquisition Management Guidebook: Series Overview
AD-A055 575/5CP

An Interactive Graphics Approach to the Flight Deck Handling Problem
AD-778 635/3CP

COMMAND + CONTROL SYSTEMS

Survivability Analysis of Command and Control Systems
AD-755 846/CP

COMMON CARRIERS

The Domestic Telecommunications Industry: Economic Behavior, Competition, and Public Policy. Appendices
PB-238 019/4CP

COMMUNICATING

Astronaut/Computer Communication Study Final Report
N71-25922/CP

COMMUNICATION AND RADIO SYSTEMS

Effective Ionospheric Height for a Simplified Mode Conversion Model at VLF
AD-A020 642/5CP

A Simulation Model for Analyzing Performance of Some Simple Communication Systems on a Digital Computer
AD-A036 437/2CP

Integrated DoD Voice and Data Networks and Ground Packet Radio Technology Volume 1. Integrated DoD Voice and Data Networks. Part 1
AD-A039 329/8CP

Microprocessor Utilization in Communications System Monitoring
AD-A042 145/3CP

Simulation Model for Air Traffic Control Communications
AD-A044 256/6CP

Automated UHF Frequency Assignment System for FAA Air Traffic Control Communications
AD-A047 847/9CP

The ROSCOE Manual. Volume 20 - Satellite Communication Model
AD-A047 918/8CP

Building Blocks for C3 Systems
AD-A052 568/3CP

Software Acquisition Management Guidebook: Cost Estimation and Measurement
AD-A055 574/8CP

Software Acquisition Management Guidebook: Series Overview
AD-A055 575/5CP

Selective Calling Device for the Mobile Maritime Service
AD-769 434/2CP

Communications Support Requirements (COMSR) Study. Volume 8, Appendix C
AD-778 237/8CP

Error Probability Characteristics for Orthogonal Multiple Alternative Communication with D-Fold Diversity
AD-781 845/3CP

COMMUNICATION EQUIPMENT

PROXVAL Program Description
AD-A022 141/6CP

Interactive Communication Systems Modeling Study
AD-A026 409/3CP

A Preliminary Cost Analysis of the Communications Processor for the F-15 Joint Tactical Information Distribution System
AD-A027 365/6CP

AN/TSQ-84 Upgraded Components
AD-A042 467/1CP

Research in Integrated, High-Frequency Communication Circuits
AD-A043 560/2CP

Security Kernel Specification for a Secure Communications Processor
AD-A045 452/0CP

Summary of the System, Support, and Special-Purpose Software Used by the Sanguine Simulation Facility
AD-753 115/CP

Equipment for Experimental Study of Communication Via Meteor Track
N71-26533/CP

COMMUNICATION NETWORKS

Analysis of a Random Communication Network by Simulation
AD-765 687/9CP

COMMUNICATION PROCESSORS

A Preliminary Cost Analysis of the Communications Processor for the F-15 Joint Tactical Information Distribution System
AD-A027 365/6CP

COMMUNICATION SATELLITE TERMINALS

Computer Software for the Navy K-Band Satellite Communications Terminal
AD-A027 220/3CP

High Altitude Satellite Communications, with Crosslinks
AD-A037 118/7CP

Investigation of the Use of Frequency-Division Multiple Access for Application with a Mix of User Terminals. Volume I. Summary and Results
AD-A047 042/7CP

Investigation of the Use of Frequency-Division Multiple Access for Application with a Mix of User Terminals. Volume II. Appendices
AD-A047 044/3CP

Investigation of the Use of Frequency-Division Multiple Access for Application with a Mix of User Terminals. Volume III. Multiple-Access Techniques
AD-A047 045/0CP

Multiple Beam Torus Antenna Study. Volume II
AD-A047 158/1CP

FCC Coordination Contour Program for Domestic Satellite Earth Stations
PB-241 628/7CP

Earth Terminal Measurement System Operations Manual
PB-284 589/9CP

COMMUNICATION SATELLITES

Intermodulation Considerations for the GAPFILLER Satellite
AD-A024 831/0CP

High Altitude Satellite Communications, with Crosslinks
AD-A037 118/7CP

Air Traffic Control Experimentation and Evaluation with the NASA ATS-6 Satellite. Volume II. Demonstration of Satellite-Supported Communications and Surveillance for Oceanic Air Traffic Control
AD-A042 146/1CP

Rooftop Antenna Pointing Program
AD-A047 999/8CP

Description of the MILSATCOM Loading Program 'OPAL'
AD-A054 878/4CP

Users Guide for the MILSATCOM Loading Program 'OPAL'
AD-A054 879/2CP

Description of the MILSATCOM Loading Program 'OPAL': GPSCS Addendum
AD-A054 880/0CP

Users Guide for the MILSATCOM Loading Program 'OPAL': GPSCS Addendum
AD-A054 881/8CP

Combined Quarterly Technical Report No. 9. Volume 1. Packet Broadcast by Satellite PLURIBUS Satellite IMP Development UNIX System Development
AD-A055 438/6CP

Combined Quarterly Technical Report Number 9. Volume 2. Private Line Interface Development Packet Network Security
AD-A055 439/4CP

AFSATCOM Life Cycle Cost Model
AD-A056 102/7CP

Calculations of Interference Potential Between Geostationary Satellite Networks: Program WARC 71.A29 User's Manual
COM-74-10752/5CP

Satellite Broadcasting System Study
N72-17111/CP

Information Transfer Satellite Concept Study. Volume 4 Computer Manual
N72-18864/CP

Television Broadcast Satellite Systems, Volume 1
N72-31176/CP

Technology Forecasting for Space Communication. Task One Report: Cost and Weight Tradeoff Studies for Eos and Tdrs.
N76-16129/8CP

Shuttle User Analysis (Study 2.2): Volume 3. Business Risk and Value of Operations in Space (Bravo). Part 4: Computer Programs and Data Look-Up.
N76-32226/2CP

Geostationary Orbit Avoidance Computer Program
PB-211 500/CP

Geostationary Orbit Avoidance Computer Program (Card Deck)
PB-211 501/CP

The Quasi-Stationary Satellite Orbit
PB-240 349/1CP

Satellite System Interference Modeling (11.7-12.2 GHz)
PB-258 737/6CP

Automated Computing and Plotting of Geostationary Satellite Earth Footprints: Program Footprints User's Manual
PB-267 953/8CP

Power and Beam Pointing Restrictions for Geostationary Orbit Avoidance: Program ORBITCHECK User's Manual
PB-268 027/0CP

COMMUNICATION SATELLITES (ACTIVE)

Optimum Allocation of Communication Satellite Resources
AD-814 488/CP

COMMUNICATION SATELLITES (PASSIVE)

A New Satellite Multiple Access Technique.
AD-713 674/CP

COMMUNICATION SWITCHING CENTERS

An Experimental Implementation of a FORMAT D Message Analyser by Syntactic Specification
AD-A028 934/8CP

SCCU/MCCU Characteristics for Autodin II
AD-A037 214/4CP

Integrated DoD Voice and Data Networks and Ground Packet Radio Technology Volume 1. Integrated DoD Voice and Data Networks. Part 1
AD-A039 329/8CP

Integrated DoD Voice and Data Networks and Ground Packet Radio Technology. Volume 1. Integrated DoD Voice and Data Networks. Part 2
AD-A039 330/6CP

Integrated DoD Voice and Data Networks and Ground Packet Radio Technology Volume 2. Cost Trends for Large Volume Packet Networks
AD-A039 331/4CP

Integrated DoD Voice and Data Networks and Ground Packet Radio Technology Volume 3. Topological Gateway Placement Strategies
AD-A039 332/2CP

Integrated DoD Voice and Data Networks and Ground Packet Radio Technology Volume 4. Ground Packet Radio Technology
AD-A039 333/0CP

Modification of the AN/TGC-26 Multiple Address Processing Unit to Accept JANAP 128 Format
AD-A039 720/8CP

Extensions of Stochastic Network Theory to Facilitate the Development of MOE's for Communication Systems
AD-A041 314/6CP

AN/TSQ-84 Upgraded Components
AD-A042 467/1CP

COMMUNICATION SYSTEMS

Scate Mark V, Feasibility Demonstration.
AD-709 638/CP

Study of Electronic Handling of Mail. Completion Report for Work Task 5. Transmission Methods.
AD-715 121/CP

Pennsylvania-Princeton Army Avionics Research Program. Army Aircraft Communication Task
AD-738 178/CP

Analysis of a Random Communication Network by Simulation
AD-765 687/9CP

Development of New Techniques for Cost-Effective Network Designs
AD-913 995/7CP

COMMUNICATION TERMINALS

TELNET under Single-Connection TCP Specification
AD-A024 821/1CP

Digital Controller Communication Link
AD-A028 245/9CP

WWMCCS System 700 Remote Terminal, Test and Diagnostic Software Utilization
AD-A033 092/8CP

Evaluation of the Burroughs 3500 CRT Enhancement Program Communications System
AD-A037 086/6CP

Interactive Communication Systems Modeling Study
AD-A037 833/1CP

COMMUNICATION THEORY

Energy Use for the Autoregressive Channel with Noiseless Feedback: Numerican Study
AD-923 122/6CP

COMMUNICATIONS CENTRAL

Modification of the AN/TGC-26 Multiple Address Processing Unit to Accept JANAP 128 Format
AD-A039 720/8CP

Survivability Analysis of Command and Control Systems
AD-755 846/CP

A Computer Simulation of a Base Telecommunication Center
AD-776 783/3CP

Communications Support Requirements (COMSR) Study. Volume 8, Appendix C
AD-778 237/8CP

COMMUNICATIONS MANAGEMENT

Incorporation of Monitoring Data in the Frequency Assignment Process of the FCC Spectrum Management Task Force
PB-234 530/4CP

AFAM: Automatic Frequency Assignment Model
PB-243 555/0CP

National and Regional Spectrum Management Planning Assistance. Volume II
PB-243 680/6CP

COMMUNICATIONS NETWORKS

ARPA Policy-Formulation Interrogation Network
AD-A002 489/3CP

GOSPRE - A Simple Analytical Program for Computing Grade of Service in a Heavily Loaded Communications Network
AD-A006 449/3CP

Improvements in Routing for Packet-Switched Networks
AD-A006 652/2CP

A Computer Program for the Simulation of Store and Forward Telegraph Networks
AD-A011 083/3CP

MINUTEMAN FSD Communications Study Report
AD-A012 230/9CP

SYMRAP -- A Symbolic Reliability Analysis Program
AD-A013 730/7CP

Store-and-Forward Network Performance Model (MODI)
AD-A014 542/5CP

The 'Standard' MUX Bus: Some Constraints on Information Flow Arising from MIL-STD-1553 (USAF)
AD-A017 677/6CP

The ECSS II Language for Simulating Computer Systems
AD-A021 262/1CP

A Unified Approach to Modelling Loop Service Systems: A Preliminary Report
AD-A021 940/2CP

Distributed Computation Study
AD-A024 670/2CP

ARPA Internetwork Protocols Project Status Report
AD-A024 819/5CP

Single-Connection TCP Specification (Preliminary Documentation)
AD-A024 820/3CP

TELNET under Single-Connection TCP Specification
AD-A024 821/1CP

TCP Resynchronization
AD-A024 822/9CP

ARPA Internetwork Protocols Project Status Report
AD-A024 823/7CP

The Interface Message Processor Program
AD-A025 358/3CP

NETDEN: An Interactive Network Design Graphics Simulation
AD-A029 225/0CP

Avoidance of Collateral Blast Damage to Increase Survivability of Military Telecommunications Networks
AD-A030 462/6CP

NSW GCOS Connection
AD-A030 508/6CP

Final Report
AD-A030 551/6CP

Computer Network Research
AD-A031 242/1CP

WWMCCS System 700 Remote Terminal, Test and Diagnostic Software Utilization
AD-A033 092/8CP

The ARPANET Network Control Center Program
AD-A033 351/8CP

ATEC Digital Adaptation Study. Volume III. Summary and Recommendations
AD-A033 716/2CP

Definition of Real-Time Adaptive Control (RTAC) of the Defense Satellite Communications System (DSCS). Volume V. Computer Program Description and Development for a Real-Time Adaptive Control Study
AD-A034 509/0CP

Redundant Ring Structures for Shipboard Distributed Computer Systems
AD-A035 886/1CP

SCCU/MCCU Characteristics for Autodin II
AD-A037 214/4CP

Design Plan for GCOS/ARPANET Interface
AD-A038 433/9CP

Integrated DoD Voice and Data Networks and Ground Packet Radio Technology Volume 1. Integrated DoD Voice and Data Networks. Part 1
AD-A039 329/8CP

Integrated DoD Voice and Data Networks and Ground Packet Radio Technology. Volume 1. Integrated DoD Voice and Data Networks. Part 2
AD-A039 330/6CP

Integrated DoD Voice and Data Networks and Ground Packet Radio Technology Volume 2. Cost Trends for Large Volume Packet Networks
AD-A039 331/4CP

Integrated DoD Voice and Data Networks and Ground Packet Radio Technology Volume 3. Topological Gateway Placement Strategies
AD-A039 332/2CP

Integrated DoD Voice and Data Networks and Ground Packet Radio Technology Volume 4. Ground Packet Radio Technology
AD-A039 333/0CP

The Interface Message Processor Program
AD-A040 675/1CP

Design Specification for AFCS Universal Performance Assessment and Control System
AD-A040 926/8CP

Development of a Hierarchical, Dynamically Reconfigurable Input/Output Network
AD-A041 186/8CP

Extensions of Stochastic Network Theory to Facilitate the Development of MOE's for Communication Systems
AD-A041 314/6CP

Microprocessor Utilization in Communications System Monitoring
AD-A042 145/3CP

University College London ARPANET Project
AD-A044 419/0CP

A Computer Model for Simulation of Message Processing in Military Exercise Control and Evaluation Systems
AD-A045 832/3CP

Graph Theory and Combinatorics with Applications to Digital Systems and Networks
AD-A045 899/2CP

Framework and Functions of the 'MS' Personal Message System
AD-A048 774/4CP

Analysis of Jitter Characteristics in a Pulse Stuffing TDM Network
AD-A049 310/6CP

X-SIM. A Dynamic Communications Simulator for the X-Tree Network Report and User's Manual
AD-A055 945/0CP

Data Network Referee (DNR) Concept Report
AD-A056 960/8CP

A Prototype Ring Interface for the NPS Data Communication Ring
AD-781 862/8CP

Multicommodity Network Plotting via Program NETPLT
AD-783 954/1CP

Some New Algorithms for Deterministic and Probabilistic Communication Networks
AD-785 119/9CP

The Network Control Center Program
AD-786 134/7CP

The Terminal Interface Message Processor Program
AD-786 135/4CP

Multicommodity Network Plotting via Program NETPLT
COM-74-50634/6CP

COMMUNICATIONS SATELLITES

A Numerical Method for Generating Earth Coverage Footprints from Geostationary Antennas
PB-252 688/7CP

COMMUNICATIONS THEORY

Analysis of Wideband Scope Creek Report Data Using Computer Techniques
AD-A038 531/0CP

COMMUNICATIONS TRAFFIC

Advance Identification of Catastrophic Traffic Build-Up in the Naval Telecommunication Command
AD-A015 960/8CP

An Experimental Implementation of a FORMAT D Message Analyser by Syntactic Specification
AD-A028 934/8CP

Offered Traffic Calculations
AD-A052 365/4CP

Modeling the Service Quality of Consolidated Coast Guard 500 kHz Operations
COM-75-10795/3CP

COMPOSING

A Contribution to Computer Typesetting Techniques: Tables of Coordinates for Hershey's Repertory of Occidental Type Fonts and Graphic Symbols
PB-251 845/4CP

SUBJECT INDEX

COMPUTATIONAL LINGUISTICS

The CASPERS Linguistic Analysis System
AD-A016 701/5CP

COMPUTATIONS

Distributed Computation Study
AD-A024 670/2CP

COMPUTER AIDED DESIGN

Multiplex Simulator Design Study
AD-A037 226/8CP

URLIM - A Unified Radome Limitations Computer Program. Volume 2. User's Guide
AD-A057 459/0CP

COMPUTER AIDED TYPESETTING

Computer Science and Technology: FORTRAN IV Enhanced Character Graphics
PB-279 939/3CP

COMPUTER APPLICATIONS

Speech Synthesis by a Programmable Digital Filter
AD-A019 842/4CP

Automatic Translation of English Text to Phonetics by Means of Letter-to-Sound Rules
AD-A021 929/5CP

An Experimental Implementation of a FORMAT D Message Analyser by Syntactic Specification
AD-A028 934/8CP

Instrumentation Development Investigation of Command and Control Console
AD-A029 967/7CP

Computer Identification of Phonemes in Continuous Speech
AD-A034 274/1CP

Design Specification for AFCS Universal Performance Assessment and Control System
AD-A040 926/8CP

COMPUTER CODES

Applications of Computer-Generated Perspective Plots.
LA-UR-74-509

Noise Immunity in Digital Communication by Use of Orthogonal Signal Correlation and Walsh Functions.
LA-5896

AMPS Automated Message Processing System, LER 76-101701A
UCID-17375

COMPUTER COMMUNICATIONS

Optimizing Distributed Data Bases -- a Framework for Research
AD-A021 610/1CP

Communications Processors: Categories, Applications, and Trends
AD-A023 692/7CP

Distributed Computation Study
AD-A024 670/2CP

TCP Resynchronization
AD-A024 822/9CP

The Interface Message Processor Program
AD-A025 358/3CP

Digital Controller Communication Link
AD-A028 245/9CP

NSW GCOS Connection
AD-A030 508/6CP

The ARPANET Network Control Center Program
AD-A033 351/8CP

Redundant Ring Structures for Shipboard Distributed Computer Systems
AD-A035 886/1CP

Security Kernel Evaluation for Multics and Secure Multics Design, Development and Certification
AD-A038 261/4CP

TENEX MSG User Manual
AD-A039 599/6CP

The Interface Message Processor Program
AD-A040 675/1CP

An Implementation of the MSG Interprocess Communication Protocol
AD-A041 630/5CP

Design and Abstract Specification of a Multics Security Kernel. Volume I
AD-A048 576/3CP

A Computerized Command and Control System for the Los Angeles City Fire Department
AD-A054 750/5CP

Research on Interlisp and Network-Based Systems
AD-A056 579/6CP

Multics Security Kernel Validation: Proof Description. Volume I
AD-A056 901/2CP

Data Network Referee (DNR) Concept Report
AD-A056 960/8CP

COMPUTER FILES

Distributed Computation and TENEX-Related Activities
AD-A018 660/1CP

Optimizing Distributed Data Bases -- a Framework for Research
AD-A021 610/1CP

COMPUTER GRAPHICS

Raster Graphics Image Transformer
AD-A017 483/9CP

NETDEN: An Interactive Network Design Graphics Simulation
AD-A029 225/0CP

Decision Analysis as an Element in an Operational Decision Aiding System (Phase IV)
AD-A045 083/3CP

Astronaut/Computer Communication Study Final Report
N71-25922/CP

A Contribution to Computer Typesetting Techniques: Tables of Coordinates for Hershey's Repertory of Occidental Type Fonts and Graphic Symbols
PB-251 845/4CP

Computer Science and Technology: FORTRAN IV Enhanced Character Graphics
PB-279 939/3CP

COMPUTER LOGIC

B-1 EMUX Automated Logic Diagrammer Demonstration Program
AD-A056 964/0CP

COMPUTER NETWORKS

ARPA Policy-Formulation Interrogation Network
AD-A002 489/3CP

Improvements in Routing for Packet-Switched Networks
AD-A006 652/2CP

The ECSS II Language for Simulating Computer Systems
AD-A021 262/1CP

Optimizing Distributed Data Bases -- a Framework for Research
AD-A021 610/1CP

Distributed Computation Study
AD-A024 670/2CP

ARPA Internetwork Protocols Project Status Report
AD-A024 819/5CP

Single-Connection TCP Specification (Preliminary Documentation)
AD-A024 820/3CP

TELNET under Single-Connection TCP Specification
AD-A024 821/1CP

TCP Resynchronization
AD-A024 822/9CP

ARPA Internetwork Protocols Project Status Report
AD-A024 823/7CP

Distributed Computation and TENEX-Related Activities
AD-A025 956/4CP

NSW GCOS Connection
AD-A030 508/6CP

Computer Network Research
AD-A031 242/1CP

The Terminal Interface Message Processor Program
AD-A031 617/4CP

Minimizing the Naming Facilities Requiring Protection in a Computing Utility
AD-A031 909/5CP

The ARPANET Network Control Center Program
AD-A033 351/8CP

The Terminal Interface Message Processor Program
AD-A038 344/8CP

Design Plan for GCOS/ARPANET Interface
AD-A038 433/9CP

A General Computer Network Simulation Model
AD-A039 772/9CP

Development of a Hierarchical, Dynamically Reconfigurable Input/Output Network
AD-A041 186/8CP

An Implementation of the MSG Interprocess Communication Protocol
AD-A041 630/5CP

University College London ARPANET Project
AD-A044 419/0CP

EQN Models for the Analysis and Design of a Computer Network of Functionalized Processors
AD-A045 721/8CP

Graph Theory and Combinatorics with Applications to Digital Systems and Networks
AD-A045 899/2CP

Adaptive Routing Techniques for Message Switching Computer-Communication Networks
AD-749 678/CP

A Prototype Ring Interface for the NPS Data Communication Ring
AD-781 862/8CP

The Network Control Center Program
AD-786 134/7CP

State Criminal Justice Telecommunications (Stacom). Volume 4: Network Design Software User'S Guide.
N78-16221/1CP

AMPS Automated Message Processing System, LER 76-101701A
UCID-17375

COMPUTER OUTPUT MICROFILM

A Contribution to Computer Typesetting Techniques: Tables of Coordinates for Hershey's Repertory of Occidental Type Fonts and Graphic Symbols
PB-251 845/4CP

COMPUTER PERFORMANCE EVALUATION

X-SIM. A Dynamic Communications Simulator for the X-Tree Network Report and User's Manual
AD-A055 945/0CP

COMPUTER PROGRAM DOCUMENTATION

AN/UYK-17(XB-1)(V) Signal Processing Element Microprogramming Support Software
AD-A016 806/2CP

Distributed Computation and TENEX-Related Activities
AD-A022 380/0CP

Distributed Computation and TENEX-Related Activities
AD-A025 956/4CP

Computer Software for the Navy K-Band Satellite Communications Terminal
AD-A027 220/3CP

Program Documentation for the Digital Switching Experiment Program
AD-A030 363/6CP

Design Specification for AFCS Universal Performance Assessment and Control System
AD-A040 926/8CP

Single-Channel Voice-Response-System Program Documentation. Volume I. System Description
AD-A051 543/7CP

Application of Tactical Data System Computer-Programming Specification to TAOC
AD-A055 167/1CP

COMPUTER PROGRAM VERIFICATION

State Deltas: A Formalism for Representing Segments of Computation
AD-A046 273/9CP

COMPUTER PROGRAMMING

The ECSS II Language for Simulating Computer Systems
AD-A021 262/1CP

EQN Models for the Analysis and Design of a Computer Network of Functionalized Processors
AD-A045 721/8CP

The Network Control Center Program
AD-786 134/7CP

The Terminal Interface Message Processor Program
AD-786 135/4CP

A User's Guide to Path Loss Computations
COM-72-11297/CP

A Set of Satellite Link Calculation Programs
N73-33108/4CP

A User's Guide to RADIAT, CONTOUR, CLIPPING, SKYWAVE
PB-260 427/0CP

COMPUTER PROGRAMS

The CASPERS Linguistic Analysis System
AD-A016 701/5CP

Method of Optimization of a Periodic Step Waveform for Minimization of Total Harmonic Distortion
AD-A020 156/6CP

Preliminary Reference Manual for Program STAMP (STatistics of Acoustic Measurements and Predictions)
AD-A020 742/3CP

Application of the Computer for Real Time Encoding and Decoding of Cyclic Block Codes
AD-A021 818/0CP

PROXVAL Program Description
AD-A022 141/6CP

The Interface Message Processor Program
AD-A025 358/3CP

Distributed Computation and TENEX-Related Activities
AD-A025 956/4CP

Computer Software for the Navy K-Band Satellite Communications Terminal
AD-A027 220/3CP

NETDEN: An Interactive Network Design Graphics Simulation
AD-A029 225/0CP

Final Report
AD-A030 551/6CP

WWMCCS System 700 Remote Terminal, Test and Diagnostic Software Utilization
AD-A033 092/8CP

WCCM Automated Command and Control Support
AD-A033 559/6CP

SUBJECT INDEX

Analysis of Languages for Man-Machine Voice Communication
AD-A035 564/4CP

High Altitude Satellite Communications, with Crosslinks
AD-A037 118/7CP

Antenna Pattern Distortion Computer Program
AD-A038 142/6CP

Integrated DoD Voice and Data Networks and Ground Packet Radio Technology Volume 1. Integrated DoD Voice and Data Networks. Part 1
AD-A039 329/8CP

Integrated DoD Voice and Data Networks and Ground Packet Radio Technology. Volume 1. Integrated DoD Voice and Data Networks. Part 2
AD-A039 330/6CP

Integrated DoD Voice and Data Networks and Ground Packet Radio Technology Volume 2. Cost Trends for Large Volume Packet Networks
AD-A039 331/4CP

Integrated DoD Voice and Data Networks and Ground Packet Radio Technology Volume 3. Topological Gateway Placement Strategies
AD-A039 332/2CP

Integrated DoD Voice and Data Networks and Ground Packet Radio Technology Volume 4. Ground Packet Radio Technology
AD-A039 333/0CP

The Interface Message Processor Program
AD-A040 675/1CP

Fiber Optics Design Aid Package
AD-A040 772/6CP

A Research Program in Computer Technology
AD-A045 673/1CP

Communications Oriented Language (COL): Language Definition
AD-A047 392/6CP

Communications Oriented Language (COL): Language Implementation and Usage
AD-A047 393/4CP

Interactive Digital Receiver Simulator (IDRS) System User's Manual and Software Documentation
AD-A053 684/7CP

Description of the MILSATCOM Loading Program 'OPAL'
AD-A054 878/4CP

Users Guide for the MILSATCOM Loading Program 'OPAL'
AD-A054 879/2CP

Description of the MILSATCOM Loading Program 'OPAL': GPSCS Addendum
AD-A054 880/0CP

Users Guide for the MILSATCOM Loading Program 'OPAL': GPSCS Addendum
AD-A054 881/8CP

Software Acquisition Management Guidebook: Cost Estimation and Measurement
AD-A055 574/8CP

Software Acquisition Management Guidebook: Series Overview
AD-A055 575/5CP

Propagation Model (0.1 to 20 GHz) Extensions for 1977 Computer Programs
AD-A055 605/0CP

URLIM - A Unified Radome Limitations Computer Program. Volume 2. User's Guide
AD-A057 459/0CP

Antenna Pattern Distortion Computer Program
AD-767 906/1CP

Encapsulation: An Approach to Operating System Security
AD-771 758/0CP

FOREST - A Computer Program to Compute Radio Loss Between Two Antennas Embedded in a Forest Environment
AD-777 501/8CP

Communications Support Requirements (COMSR) Study. Volume 8, Appendix C
AD-778 237/8CP

Multicommodity Network Plotting via Program NETPLT
AD-783 954/1CP

Optimum Allocation of Communication Satellite Resources
AD-814 488/CP

Prediction Routine Studies. Volume I. Sample Problems and Frequency Band Analysis
AD-846 957/CP

Prediction Routine Studies. Volume II. Intermodulation Analysis
AD-846 961/CP

Prediction Route Studies. Volume III. Field Strength/Power Density Program
AD-846 962/CP

Busy Hour Model Program Reports
AD-917 036/6CP

Autodin Time Sharing Editor System Program Reports
AD-917 041/6CP

Busy Hour Model User's Manual
AD-917 046/5CP

Autodin Time Sharing Editor System Users Manual
AD-917 047/3CP

Space/Terrestrial Radio Service Coordination Areas: Program WARC 71.A28 User's Manual
COM-74-10409/2CP

Multicommodity Network Plotting via Program NETPLT
COM-74-50634/6CP

A Computer Program for Evaluating Radio Signal Propagation from Artificial Earth Satellites.
N70-27491/CP

Formulation of a Telemetry Computer Program Final Report.
N70-32456/CP

Study and Development of a Mathematical Analysis for the Performance Assessment of Space Communication System Parameters Final Report
N71-28162/CP

Satellite Broadcasting System Study
N72-17111/CP

Information Transfer Satellite Concept Study. Volume 4 Computer Manual
N72-18864/CP

The Genrel Teletype Package
N72-26118/CP

Television Broadcast Satellite Systems, Volume 1
N72-31176/CP

Development of Communications Analysis Techniques
N73-16125/CP

Spectral Analysis Program. Volume 1: User'S Guide
N73-26145/5CP

Spectral Analysis Program (Sap). Volume 2: Programmer'S Manual
N73-26146/3CP

Frequency Modulation Television Analysis: Threshold Impulse Analysis
N74-16885/7CP

Computer-Aided Design in Television Circuits.
N74-31620/9CP

Gospre: A Simple Analytical Program for Computing Grade of Service in a Heavily Loaded Communications Network.
N75-29301/9CP

Study of Spread Spectrum and Convolutional Code Techniques. Volume 2: Software Descriptions.
N77-18319/2CP

Development of Smoothing Spline Functions for Telemetry Data. Volume 3: Programs and Numerical Results Etude du Developpement des Fonctions-Spline de Lissage pour des Donnees de Telemesure. Volume 3 (Programmes et Resultats Numeriques).
N77-21913/7CP

State Criminal Justice Telecommunications (Stacom). Volume 4: Network Design Software User'S Guide.
N78-16221/1CP

PERDIS Bearing and Distance Computer Program
PB-210 582/CP

Geostationary Orbit Avoidance Computer Program
PB-211 500/CP

Geostationary Orbit Avoidance Computer Program (Card Deck)
PB-211 501/CP

PERDIS. A Computer Program to Determine if Two Antenna Beams Intersect and Provide the Perpendicular Distance Between the Beam Axes
PB-221 257/9CP

Wilderness Area Simulation Model - User's Manual
PB-233 364/9CP

Wilderness Area Simulation Model
PB-233 488/6CP

EMC Analytical Models for Programmable Desk Top Calculators
PB-239 680/2CP

User's Manual for COORD (FCC Coordination Contour Program for Domestic Satellite Earth Stations)
PB-240 199/0CP

FCC Coordination Contour Program for Domestic Satellite Earth Stations
PB-241 628/7CP

A Versatile Three-Dimensional Ray Tracing Computer Program for Radio Waves in the Ionosphere
PB-248 856/7CP

Field Strength Calculation for TV and FM Broadcasting (Computer Program TVFMFS)
PB-249 144/7CP

TV and FM Broadcasting Field Strength (TVFMFS) Computer Program
PB-251 129/3CP

RADIAT Computer Program
PB-260 426/2CP

An Automated Procedure for Predicting Potential Electromagnetic Interference between Space and Terrestrial Systems Within the Coordination Areas in the Bands between 7.25 and 8.4 GHz
PB-261 229/9CP

Convert Ebcdic Photon Typesetter Drive Tapes to Tts Code.
PB-266 790/5CP

A Program Description of 'Orbit - Prints': Contours of Power Density at the Geostationary Orbit
PB-271 815/3CP

Computer Science and Technology: FORTRAN IV Enhanced Character Graphics
PB-279 939/3CP

COMPUTER SOFTWARE

AN/UYK-17(XB-1)(V) Signal Processing Element Microprogramming Support Software
AD-A016 806/2CP

Distributed Computation and TENEX-Related Activities
AD-A022 380/0CP

Distributed Computation and TENEX-Related Activities
AD-A025 956/4CP

Computer Software for the Navy K-Band Satellite Communications Terminal
AD-A027 220/3CP

WWMCCS System 700 Remote Terminal, Test and Diagnostic Software Utilization
AD-A033 092/8CP

Design Plan for GCOS/ARPANET Interface
AD-A038 433/9CP

COMPUTER SYSTEMS PROGRAMS

Teleprocessing Systems Study. Volume III. Program Listings and Documentation
PB-220 659/7CP

COMPUTERIZED DESIGN

Computer-Aided Design in Television Circuits.
N74-31620/9CP

COMPUTERIZED SIMULATION

Computer Simulation of MUX Bus Voltage Waveforms under Steady State Conditions
AD-A013 107/8CP

The ECSS II Language for Simulating Computer Systems
AD-A021 262/1CP

Interactive Communication Systems Modeling Study
AD-A026 409/3CP

COMMEL II User's Manual. Volume I. Model Overview
AD-A031 613/3CP

COMMEL II User's Manual. Volume II. Input Data Preparation
AD-A031 614/1CP

COMMEL II User's Manual. Volume III. Appendixes
AD-A031 615/8CP

A Simulation Model for Analyzing Performance of Some Simple Communication Systems on a Digital Computer
AD-A036 437/2CP

A General Computer Network Simulation Model
AD-A039 772/9CP

Simulation Model for Air Traffic Control Communications
AD-A044 256/6CP

A Computer Model for Simulation of Message Processing in Military Exercise Control and Evaluation Systems
AD-A045 832/3CP

Simulation Code for Underwater Television Systems (SCOUTS)
AD-A048 769/4CP

Applications Guide for Propagation and Interference Analysis Computer Programs (0.1 to 20 GHz)
AD-A053 242/4CP

Structured Analysis and Design of a Satellite Simulator
AD-A055 192/9CP

X-SIM. A Dynamic Communications Simulator for the X-Tree Network Report and User's Manual
AD-A055 945/0CP

Cost Effectiveness Program Plan for Joint Tactical Communications. Volume III. Life Cycle Costing. Appendix F. Computer Models for LCC
AD-A056 981/4CP

Summary of the System, Support, and Special-Purpose Software Used by the Sanguine Simulation Facility
AD-753 115/CP

Computer Simulation of Error-Correcting Codes
AD-777 198/3CP

Simulation Studies for NOAA Stabilized Compensation Program
COM-74-10517/2CP

Electronic Scene Generator Expansion System
N72-28232/CP

Advanced Communication System Time Domain Modeling Techniques Asystd Software Description. Volume 1 Program Users Guide
N72-30148/CP

Advanced Communication System Time Domain Modeling Techniques Asystd Software Description. Volume 2 Program Support Documentation
N72-30149/CP

A Computer Program for the Simulation of Store and Forward Telegraph Networks.
N75-33297/3CP

Analysis and Simulation of a Syndrome Decoder for a Constraint Length K Equals 5, Rate R Equals 1/2 Binary Convolutional Code.
N76-16310/4CP

Performance Analysis of Viterbi Decoding of Convolutional Coded Data Transmitted over a Non-Linear Channel Using Modsim. Volume 1: Theory and Test Cases.
N77-18318/4CP

Study of Spread Spectrum and Convolutional Code Techniques. Volume 2: Software Descriptions.
N77-18319/2CP

Analytic Techniques for Processing Signal and Noise Through a Non-Linear Channel Using Modsim. Volume 2: Software Description.
N77-18784/7CP

Phase-Lock Loop Models for Systid Simulations, Volume 4.
N78-23271/7CP

Wilderness Area Simulation Model - User's Manual
PB-233 364/9CP

Wilderness Area Simulation Model
PB-233 488/6CP

Conversion Subsystems for the Electronic Mail Handling Program. Task II Report, A Digital Simulation Model
PB-235 201/1CP

MERTL (Multidrop Efficiency Regarding Transmission Lines)
PB-271 320/4CP

COMPUTERS

Distributed Computation Study
AD-A024 670/2CP

An Implementation of the MSG Interprocess Communication Protocol
AD-A041 630/5CP

Using British Standard Interfaces to Create a Fast Link Between Two Computers
AD-A052 087/4CP

A Prototype Ring Interface for the NPS Data Communication Ring
AD-781 862/8CP

Applications of Computer-Generated Perspective Plots.
LA-UR-74-509

CONDENSATION TRAILS

Project SECEDE. Tracking Barium releases using the TV-TRACK System
AD-731 574/CP

CONFERENCES

Significant Accomplishments in Technology, Goddard Space Flight Center, 1970
N72-25755/CP

CONFIDENCE LIMITS

Confidence Limits for Digital Error Rates from Dependent Transmissions
PB-267 777/1CP

CONSOLES

Instrumentation Development Investigation of Command and Control Console
AD-A029 967/7CP

CONTROL SYSTEMS

Design Specification for AFCS Universal Performance Assessment and Control System
AD-A040 926/8CP

CONTROLLERS

A Demand Assignment Multiple Access (DAMA) Control System for Thin-Route Satellite Telephone Systems
PB-286 162/3CP

CONVOLUTION INTEGRALS

Analysis and Simulation of a Syndrome Decoder for a Constraint Length K Equals 5, Rate R Equals 1/2 Binary Convolutional Code.
N76-16310/4CP

CONVOLUTIONAL CODES

Performance Analysis of Viterbi Decoding of Convolutional Coded Data Transmitted over a Non-Linear Channel Using Modsim. Volume 1: Theory and Test Cases.
N77-18318/4CP

Study of Spread Spectrum and Convolutional Code Techniques. Volume 2: Software Descriptions.
N77-18319/2CP

COST ANALYSIS

Life Cycle Cost Model
AD-A013 369/4CP

A Preliminary Cost Analysis of the Communications Processor for the F-15 Joint Tactical Information Distribution System
AD-A027 365/6CP

COST EFFECTIVENESS

Cost Effectiveness Program Plan for Joint Tactical Communications. Volume III. Life Cycle Costing. Appendix F. Computer Models for LCC
AD-A027 643/6CP

Cost Effectiveness Program Plan for Joint Tactical Communications. Volume III. Life Cycle Costing. Appendix F. Computer Models for LCC
AD-A056 981/4CP

COST ESTIMATES

Life Cycle Cost Model
AD-A013 369/4CP

Technology Forecasting for Space Communication. Task One Report: Cost and Weight Tradeoff Studies for Eos and Tdrs.
N76-16129/8CP

COST MODELS

AFSATCOM Life Cycle Cost Model
AD-A056 102/7CP

CRITICAL FREQUENCIES

The Numerical Representation of the Critical Frequency of the F1 Region of the Ionosphere
COM-75-10813/4CP

CROSS CORRELATION

Cross Polarization Techniques Investigation
AD-A043 395/3CP

CROSS MODULATION

Adjacent Channel Interference Analysis
AD-850 385/CP

CROSSED FIELD DEVICES

High Speed 1.06 Micron Photomultiplier Tubes
AD-920 001/5CP

CROSSLINKS

High Altitude Satellite Communications, with Crosslinks
AD-A037 118/7CP

DATA ACQUISITION

Data Collection Operational Support System, Part 1.
N76-22246/2CP

The Deep Space Network.
N77-21110/0CP

DATA BASES

Distributed Computation and TENEX-Related Activities
AD-A018 660/1CP

Optimizing Distributed Data Bases -- a Framework for Research
AD-A021 610/1CP

Communications Support Requirements (COMSR) Study. Volume 8, Appendix C
AD-778 237/8CP

DATA COMPRESSION

3-to-1 Data Compression Via Walsh Transform
AD-774 082/2CP

Quantization of Image Transforms with Minimum Distortion
PB-274 533/9CP

DATA LINKS

Software for an Experimental Air-Ground Data Link. Volume III. Program Listings
AD-A019 964/6CP

Digital Controller Communication Link
AD-A028 245/9CP

Cross Polarization Techniques Investigation
AD-A043 395/3CP

Investigation of the Use of Frequency-Division Multiple Access for Application with a Mix of User Terminals. Volume I. Summary and Results
AD-A047 042/7CP

Investigation of the Use of Frequency-Division Multiple Access for Application with a Mix of User Terminals. Volume II. Appendices
AD-A047 044/3CP

Investigation of the Use of Frequency-Division Multiple Access for Application with a Mix of User Terminals. Volume III. Multiple-Access Techniques
AD-A047 045/0CP

Using British Standard Interfaces to Create a Fast Link Between Two Computers
AD-A052 087/4CP

Data Network Referee (DNR) Concept Report
AD-A056 960/8CP

A Set of Satellite Link Calculation Programs
N73-33108/4CP

Data Collection Operational Support System, Part 1.
N76-22246/2CP

DATA MANAGEMENT

Optimizing Distributed Data Bases -- a Framework for Research
AD-A021 610/1CP

DATA PROCESSING

A Preliminary Cost Analysis of the Communications Processor for the F-15 Joint Tactical Information Distribution System
AD-A027 365/6CP

Redundant Ring Structures for Shipboard Distributed Computer Systems
AD-A035 886/1CP

Data Analysis for Stochastic Processes
AD-A038 356/2CP

Equipment for Experimental Study of Communication Via Meteor Track
N71-26533/CP

Conversion Subsystems for the Electronic Mail Handling Program. Task IIIA Report, Evaluation of Data Compression Techniques
PB-235 202/9CP

DATA PROCESSING EQUIPMENT

Modification of the AN/TGC-26 Multiple Address Processing Unit to Accept JANAP 128 Format
AD-A039 720/8CP

DATA PROCESSING SECURITY

Distributed Computation and TENEX-Related Activities
AD-A018 660/1CP

Minimizing the Naming Facilities Requiring Protection in a Computing Utility
AD-A031 909/5CP

Security Kernel Evaluation for Multics and Secure Multics Design, Development and Certification
AD-A038 261/4CP

Security Kernel Specification for a Secure Communications Processor
AD-A045 452/0CP

Multics Security Kernel Validation: Proof Description. Volume I
AD-A056 901/2CP

DATA PROCESSING SYSTEMS

Adaptive Routing Techniques for Message Switching Computer-Communication Networks
AD-749 678/CP

TCDMS Utilities Manual (Data Management Section)
PB-250 992/5CP

DATA PROCESSING TERMINALS

NETDEN: An Interactive Network Design Graphics Simulation
AD-A029 225/0CP

The Terminal Interface Message Processor Program
AD-A031 617/4CP

WWMCCS System 700 Remote Terminal, Test and Diagnostic Software Utilization
AD-A033 092/8CP

The Terminal Interface Message Processor Program
AD-A038 344/8CP

Design Plan for GCOS/ARPANET Interface
AD-A038 433/9CP

Teleprocessing Systems Study. Volume I
PB-220 657/1CP

Teleprocessing Systems Study. Volume II. User Instruction Manual
PB-220 658/9CP

Teleprocessing Systems Study. Volume III. Program Listings and Documentation
PB-220 659/7CP

Teleprocessing Systems Study. Description of the Model
PB-220 660/5CP

DATA REDUCTION

Signal Analysis and Parametrization for EMP Data
AD-A020 493/3CP

DATA SMOOTHING

Development of Smoothing Spline Functions for Telemetry Data. Volume 3: Programs and Numerical Results Etude du Developpement des Fonctions-Spline de Lissage pour des Donnees de Telemesure. Volume 3 (Programmes et Resultats Numeriques).
N77-21913/7CP

DATA SYSTEMS

The Deep Space Network, Volume 4 Progress Report, May - Jun. 1971
N71-33163/CP

DATA TRANSMISSION

A Computer Program for the Simulation of Store and Forward Telegraph Networks.
N75-33297/3CP

Performance Analysis of Viterbi Decoding of Convolutional Coded Data Transmitted over a Non-Linear Channel Using Modsim. Volume 1: Theory and Test Cases.
N77-18318/4CP

The Deep Space Network.
N77-21110/0CP

MERTL (Multidrop Efficiency Regarding Transmission Lines)
PB-271 320/4CP

Code for the Detection of Errors for Transmission of Ten-Bit Words.
RT/EL-(74)-6

DATA TRANSMISSION SYSTEMS

Information System Theory
AD-A003 896/8CP

Hardware and Software Error Correction Coding
AD-A017 377/3CP

Parameter Selection for the Muntner-Wolf Model
AD-A019 825/9CP

Digital Controller Communication Link
AD-A028 245/9CP

A Microprocessor-Controlled Interface for Burst Processing
AD-A030 226/5CP

Computer Network Research
AD-A031 242/1CP

ATEC Digital Adaptation Study. Volume III. Summary and Recommendations
AD-A033 716/2CP

Supplemental Conceptual Design Study of an Integrated Voice/Data Switching and Multiplexing Technique for an Access Area Exchange
AD-A034 132/1CP

Redundant Ring Structures for Shipboard Distributed Computer Systems
AD-A035 886/1CP

Air Traffic Control Experimentation and Evaluation with the NASA ATS-6 Satellite. Volume II. Demonstration of Satellite-Supported Communications and Surveillance for Oceanic Air Traffic Control
AD-A042 146/1CP

University College London ARPANET Project
AD-A044 419/0CP

Analysis of Jitter Characteristics in a Pulse Stuffing TDM Network
AD-A049 310/6CP

Study of Electronic Handling of Mail. Completion Report for Work Task 5. Transmission Methods.
AD-715 121/CP

Adaptive Routing Techniques for Message Switching Computer-Communication Networks
AD-749 678/CP

On the Simulation of Radio-Linked Information Networks
AD-766 830/4CP

Energy Use for the Autoregressive Channel with Noiseless Feedback: Numerican Study
AD-923 122/6CP

DECISION MAKING

Decision Analysis as an Element in an Operational Decision Aiding System (Phase IV)
AD-A045 083/3CP

DECODERS

Convolutional Decoder Performance on VHF and Troposcatter Channels
AD-A000 670/0CP

The Performance of 31 and 127 Bit Elastic Surface Wave Encoders and Decoders
AD-762 910/CP

Analysis and Simulation of a Syndrome Decoder for a Constraint Length K Equals 5, Rate R Equals 1/2 Binary Convolutional Code.
N76-16310/4CP

DECODING

Application of the Computer for Real Time Encoding and Decoding of Cyclic Block Codes
AD-A021 818/0CP

DEEP SPACE INSTRUMENTATION FACILITY

The Deep Space Network, Volume 8
N72-22313/CP

DEEP SPACE NETWORK

The Deep Space Network, Volume 4 Progress Report, May - Jun. 1971
N71-33163/CP

The Deep Space Network, Volume 8
N72-22313/CP

The Deep Space Network.
N77-21110/0CP

DIAGNOSTIC EQUIPMENT

Economic Analysis of Selected Test Measurement and Diagnostic Equipment from the U.S Army Communications Command Preferred Items List. Volume 2. Technical Report
AD-A052 161/7CP

DICTIONARIES

Speech Understanding Systems. Volume III. Lexicon, Lexical Retrieval and Control
AD-A035 167/6CP

DIFFERENTIAL PULSE CODE MODULATION

Entropy Coded Adaptive Differential Pulse Code Modulation Systems for Speech Signals
AD-762 606/CP

DIGITAL COMMUNICATIONS

Interactive Communication Systems Modeling Study
AD-A026 409/3CP

Cross Polarization Techniques Investigation
AD-A043 395/3CP

DIGITAL COMPUTERS

AN/UYK-17(XB-1)(V) Signal Processing Element Microprogramming Support Software
AD-A016 806/2CP

The Terminal Interface Message Processor Program
AD-A031 617/4CP

Evaluation of the Burroughs 3500 CRT Enhancement Program Communications System
AD-A037 086/6CP

The Terminal Interface Message Processor Program
AD-A038 344/8CP

Energy Use for the Autoregressive Channel with Noiseless Feedback: Numerican Study
AD-923 122/6CP

DIGITAL FILTERS

Using a Two-Dimensional Discrete Hilbert Transform to Factor Two-Dimensional Polynomials
AD-A007 719/8CP

Two-Dimensional Digital Filtering and Its Uncorrelated Error Analysis
AD-A017 592/7CP

DIGITAL SYSTEMS

ATEC Digital Adaptation Study. Volume III. Summary and Recommendations
AD-A033 716/2CP

Interactive Communication Systems Modeling Study
AD-A037 833/1CP

Noise Immunity in Digital Communication by Use of Orthogonal Signal Correlation and Walsh Functions.
LA-5896

DIGITIZERS

A Digitizing System for 525 Line, 60 Hz, Monochrome Television
AD-A027 298/9CP

Codex Speech Digitizer Advanced Development Model
AD-A031 509/3CP

DIPOLE ANTENNAS

Experimental Validation of the Antenna Pattern Distortion Computer Program (VHF Antenna)
AD-A049 740/4CP

DIRECTIONAL ANTENNAS

RADIAT Computer Program
PB-260 426/2CP

DISCRETE ADDRESS BEACON SYSTEMS

Development of a Discrete Address Beacon System
AD-A046 580/7CP

DISCRETE FUNCTIONS

Review of Finite Fields: Applications to Discrete Fourier, Transforms and Reed-Solomon Coding.
N77-33875/4CP

DISK RECORDING SYSTEMS

A Digitizing System for 525 Line, 60 Hz, Monochrome Television
AD-A027 298/9CP

DISPLAY DEVICES

Astronaut/Computer Communication Study Final Report
N71-25922/CP

DISTRIBUTED COMPUTER SYSTEMS

Redundant Ring Structures for Shipboard Distributed Computer Systems
AD-A035 886/1CP

DISTRIBUTED DATA BASE

Optimizing Distributed Data Bases -- a Framework for Research
AD-A021 610/1CP

DISTRIBUTION COMPUTATIONS

Distributed Computation Study
AD-A024 670/2CP

DOCUMENTATION

Advanced Communication System Time Domain Modeling Techniques Asystd Software Description. Volume 2 Program Support Documentation
N72-30149/CP

DOPPLER EFFECT

Ionospheric Effects on the Doppler Frequency Shift in Sarsat Propagation.
N78-21334/5CP

EARPHONES

Linear Noise-Attenuating Earphone
AD-A048 846/0CP

EARTH FOOTPRINTS

Automated Computing and Plotting of Geostationary Satellite Earth Footprints: Program Footprints User's Manual
PB-267 953/8CP

ECONOMIC ANALYSIS

The Domestic Telecommunications Industry: Economic Behavior, Competition, and Public Policy. Appendices
PB-238 019/4CP

ECSS 2 PROGRAMMING LANGUAGE

The ECSS II Language for Simulating Computer Systems
AD-A021 262/1CP

ELECTRICAL LOADS

B-1 EMUX Automated Logic Diagrammer Demonstration Program
AD-A056 964/0CP

ELECTROMAGNETIC COMPATIBILITY

Electromagnetic System Interaction Algorithms (SEMCA, IPM, TRED, and COSAM are Compared with Respect to Modeling Philosophy, Flexibility, Data Base, Noises and Interferences, Interference Threshold Criteria, Attenuation Modeling and Antenna Coupling, and Printouts)
AD-A037 903/2CP

Antenna Pattern Distortion Computer Program
AD-A038 142/6CP

Microprocessor Utilization in Communications System Monitoring
AD-A042 145/3CP

EMC Analytical Models for Programmable Desk Top Calculators
PB-239 680/2CP

An Automated Procedure for Predicting Potential Electromagnetic Interference between Space and Terrestrial Systems Within the Coordination Areas in the Bands between 7.25 and 8.4 GHz
PB-261 229/9CP

ELECTROMAGNETIC ENVIRONMENTS

Electromagnetic System Interaction Algorithms (SEMCA, IPM, TRED, and COSAM are Compared with Respect to Modeling Philosophy, Flexibility, Data Base, Noises and Interferences, Interference Threshold Criteria, Attenuation Modeling and Antenna Coupling, and Printouts)
AD-A037 903/2CP

ELECTROMAGNETIC INTERFERENCE

Electromagnetic System Interaction Algorithms (SEMCA, IPM, TRED, and COSAM are Compared with Respect to Modeling Philosophy, Flexibility, Data Base, Noises and Interferences, Interference Threshold Criteria, Attenuation Modeling and Antenna Coupling, and Printouts)
AD-A037 903/2CP

The ROSCOE Manual. Volume 20 - Satellite Communication Model
AD-A047 918/8CP

ELECTROMAGNETIC PULSES

Signal Analysis and Parametrization for EMP Data
AD-A020 493/3CP

ELECTROMAGNETIC WAVE PROPAGATION

Propagation Model (0.1 to 20 GHz) Extensions for 1977 Computer Programs
AD-A055 605/0CP

ELECTRONIC ENGINEERING

Conversion Subsystems for the Electronic Mail Handling Program. Task II Report, A Digital Simulation Model
PB-235 201/1CP

Conversion Subsystems for the Electronic Mail Handling Program. Task IIIA Report, Evaluation of Data Compression Techniques
PB-235 202/9CP

ELECTRONIC EQUIPMENT

Scale Mark V, Feasibility Demonstration.
AD-709 638/CP

Electronic Scene Generator Expansion System
N72-28232/CP

Computer-Aided Design in Television Circuits.
N74-31620/9CP

ELECTRONIC MAIL HANDLING

Study of Electronic Handling of Mail. Completion Report for Work Task 5. Transmission Methods.
AD-715 121/CP

Conversion Subsystems for the Electronic Mail Handling Program. Task II Report, A Digital Simulation Model
PB-235 201/1CP

Conversion Subsystems for the Electronic Mail Handling Program. Task IIIA Report, Evaluation of Data Compression Techniques
PB-235 202/9CP

ERROR CORRECTION CODES

Hardware and Software Error Correction Coding
AD-A017 377/3CP

Application of the Computer for Real Time Encoding and Decoding of Cyclic Block Codes
AD-A021 818/0CP

Analysis of a Pseudo-Noise Addressing System for Multiple Access Communication with Applications of Error-Correcting Codes.
AD-711 001/CP

SUBJECT INDEX

Computer Simulation of Error-Correcting Codes
AD-777 198/3CP

ERROR DETECTION CODES
Study of Potential Applications of Digital Techniques to the APOLLO Unified S-Band Communications System, Phase 2 Final Report
N71-21465/CP

ERRORS
Confidence Limits for Digital Error Rates from Dependent Transmissions
PB-267 777/1CP

Code for the Detection of Errors for Transmission of Ten-Bit Words.
RT/EL-(74)-6

ESTIMATION THEORY
Relationships Between Detection and Estimation: Scalar and Array Processing
AD-A030 029/3CP

F 1 REGION
The Numerical Representation of the Critical Frequency of the F1 Region of the Ionosphere
COM-75-10813/4CP

FACSIMILE TRANSMISSION
Congestion in a System of N Service Centers with Interference
AD-787 441/5CP

FADING
Performance Analysis of Psk Signals Through Fading Channels.
N77-18320/0CP

FAST FOURIER TRANSFORMS
Constant-O Spectral Analysis by Means of an Approximate Fast Fourier Transform Technique
AD-A040 813/8CP

FEEDBACK COMMUNICATIONS
Energy Use for the Autoregressive Channel with Noiseless Feedback: Numerican Study
AD-923 122/6CP

FIBER OPTICS
Fiber Optics Design Aid Package
AD-A040 772/6CP

FIRE FIGHTING
A Computerized Command and Control System for the Los Angeles City Fire Department
AD-A054 750/5CP

FLIGHT
Voice Control Systems for Airborne Environments
AD-A043 252/6CP

FLOW CHARTS
Spectral Analysis Program (Sap). Volume 2: Programmer'S Manual
N73-26146/3CP

FORMANT ANALYSIS
The Design and Testing of a System for Formant Tracking of Voiced Speech
PB-252 484/1CP

FORMATS
An Experimental Implementation of a FORMAT D Message Analyser by Syntactic Specification
AD-A028 934/8CP

FOURIER TRANSFORMATION
Using a Two-Dimensional Discrete Hilbert Transform to Factor Two-Dimensional Polynomials
AD-A007 719/8CP

Review of Finite Fields: Applications to Discrete Fourier, Transforms and Reed-Solomon Coding.
N77-33875/4CP

Ouantization of Image Transforms with Minimum Distortion
PB-274 533/9CP

FREQUENCY ALLOCATION
Probabilistic Interference Prediction Model-Computer Programs
AD-A011 453/8CP

Automated UHF Frequency Assignment System for FAA Air Traffic Control Communications
AD-A047 847/9CP

FAA Remote Terminal System
AD-A054 604/4CP

An Automated FAA Frequency Assignment System
AD-779 086/8CP

FREQUENCY ALLOCATIONS
Incorporation of Monitoring Data in the Frequency Assignment Process of the FCC Spectrum Management Task Force
PB-234 530/4CP

VHF-TV, Computer Assignment Program (VCAP)
PB-236 272/1CP

(UCAP) - UHF-TV Channel Assignment Program
PB-241 307/8CP

AFAM: Automatic Frequency Assignment Model
PB-243 555/0CP

National and Regional Spectrum Management Planning Assistance. Volume II
PB-243 680/6CP

Implementation of User Demand and Satisfaction Model for Personal Radio Services
PB-276 611/1CP

FREQUENCY DIVISION MULTIPLE ACCESS
Investigation of the Use of Frequency-Division Multiple Access for Application with a Mix of User Terminals. Volume I. Summary and Results
AD-A047 042/7CP

Investigation of the Use of Frequency-Division Multiple Access for Application with a Mix of User Terminals. Volume II. Appendices
AD-A047 044/3CP

Investigation of the Use of Frequency-Division Multiple Access for Application with a Mix of User Terminals. Volume III. Multiple-Access Techniques
AD-A047 045/0CP

FREQUENCY MODULATION
Development of Communications Analysis Techniques
N73-16125/CP

Frequency Modulation Television Analysis: Threshold Impulse Analysis
N74-16885/7CP

FREQUENCY SHIFT
Ionospheric Effects on the Doppler Frequency Shift in Sarsat Propagation.
N78-21334/5CP

FREQUENCY SHIFT KEYERS
Energy Spectra for Frequency-Shift-Keyed Signals Transmitted by Synchronously Resonated, Very Low Frequency Antennas
AD-777 268/4CP

FREQUENCY SYNTHESIZERS
Vlf Receiver Calibration.
N74-19103/2CP

FRONT END PROCESSORS
Communications Processors: Categories, Applications, and Trends
AD-A023 692/7CP

GAS LASERS
Study of Atmospheric Effects on Laser Communications Systems. Volume 2 - Atmospheric Effects on Wave Propagation at 10.6 Microns Interim Report
N71-26419/CP

GENERATORS
Electronic Scene Generator Expansion System
N72-28232/CP

GLOBAL COMMUNICATION SYSTEMS
WWMCCS System 700 Remote Terminal, Test and Diagnostic Software Utilization
AD-A033 092/8CP

System Integration and Interface Transition Issues
AD-A041 457/3CP

Summary of the System, Support, and Special-Purpose Software Used by the Sanguine Simulation Facility
AD-753 115/CP

Fleet Multi-Channel Broadcast Traffic Intensity Study
AD-755 760/CP

Computerized Management Tools for Use in the Analysis of Autodin Automatic Switching Centers and Associated Tributaries
AD-761 479/CP

GRAPH THEORY
Some New Algorithms for Deterministic and Probabilistic Communication Networks
AD-785 119/9CP

GROUND-AIR-GROUND COMMUNICATIONS
Link Analysis Program Linkan. Volume 1: Theoretical and Programmer'S Manual.
N78-31350/9CP

Link Analysis Program Linkan.
N78-31351/7CP

GROUP DYNAMICS
Proximity: Location, Time, and Opportunity to Communicate
AD-A011 151/8CP

HARDENED STRUCTURES
MINUTEMAN FSD Communications Study Report
AD-A012 230/9CP

HARMONIC GENERATORS
Method of Optimization of a Periodic Step Waveform for Minimization of Total Harmonic Distortion
AD-A020 156/6CP

HETERODYNING
Study of Atmospheric Effects on Laser Communications Systems. Volume 2 - Atmospheric Effects on Wave Propagation at 10.6 Microns Interim Report
N71-26419/CP

HIGH LEVEL LANGUAGES
Communications Oriented Language (COL): Language Definition
AD-A047 392/6CP

Communications Oriented Language (COL): Language Implementation and Usage
AD-A047 393/4CP

HONEYWELL-6180 COMPUTERS
NSW GCOS Connection
AD-A030 508/6CP

HUMAN FACTORS ENGINEERING
A Computer Model for Simulation of Message Processing in Military Exercise Control and Evaluation Systems
AD-A045 832/3CP

IDENTIFICATION SYSTEMS
Phonemic Category Experiments
AD-B004 707/6CP

IMAGE PROCESSING
Raster Graphics Image Transformer
AD-A017 483/9CP

Slant Transform Image Coding
AD-767 758/6CP

Ouantization of Image Transforms with Minimum Distortion
PB-274 533/9CP

INFORMATION CENTERS
Executive Summary: New York City Pilots Automatic Telephone Weather Answering Service (PATWAS) Test
AD-A046 755/5CP

INFORMATION PROCESSING
Minimizing the Naming Facilities Requiring Protection in a Computing Utility
AD-A031 909/5CP

INFORMATION SYSTEMS
The Telecommunication/Data Management System (TCDMS) IBM Assembler Language Computer System Magnetic Tape, Release No. 2
PB-250 763/0CP

TCDMS Utilities Manual (Data Management Section)
PB-250 992/5CP

INFORMATION THEORY
Information System Theory
AD-A003 896/8CP

Distributed Computation and TENEX-Related Activities
AD-A022 380/0CP

HF Channel Simulation
AD-A027 429/0CP

Analysis of Wideband Scope Creek Report Data Using Computer Techniques
AD-A038 531/0CP

High Frequency (HF) Amplitude Modulation (AM) Signal-to-Interference Ratio (SIR) Study
AD-A040 948/2CP

The Effect of an Interfering Signal on the Performance of Nonparametric Detectors Using Spectral Estimates
AD-A052 350/6CP

Models for Message Transmissions and Interference-Caused Retransmission through a Multi-Channel Satellite Communications System
AD-736 115/CP

Development of a Configuration Concept of a Speech Digitizer Based on Adaptive Estimation Techniques
AD-773 388/4CP

Investigation of the Propagation Stability of a Time Spread Underwater Acoustic Channel
AD-778 683/3CP

Error Probability Characteristics for Orthogonal Multiple Alternative Communication with D-Fold Diversity
AD-781 845/3CP

Error Probability Characteristics for Uncoded F-out-of-A Communication with D-Fold Diversity
AD-783 037/5CP

Operating Characteristics for Detection of a Fading Signal in M Alternative Locations with D-Fold Diversity
AD-786 371/5CP

INFORMATION TRANSFER
Operational and Cost Considerations in the Use of Optical Waveguides in a Local Information Transfer System
AD-A053 600/3CP

INFRARED DETECTORS
High Speed 1.06 Micron Photomultiplier Tubes
AD-920 001/5CP

INPUT OUTPUT PROCESSING
COMMEL II User's Manual. Volume II. Input Data Preparation
AD-A031 614/1CP

COMMEL II User's Manual. Volume III. Appendixes
AD-A031 615/8CP

INSTRUCTIONS
A User's Guide to RADIAT, CONTOUR, CLIPPING, SKYWAVE
PB-260 427/0CP

INTEGRATED CIRCUITS
Research in Integrated, High-Frequency Communication Circuits
AD-A043 560/2CP

INTEGRATED SYSTEMS
Supplemental Conceptual Design Study of an Integrated Voice/Data Switching and Multiplexing Technique for an Access Area Exchange
AD-A034 132/1CP

INTELLIGIBILITY
The Development of a Computer Speech Processing System and Its Use for the Study and Development of Processing Methods for Enhancing the Intelligibility of Speech in Noise
AD-A047 240/7CP

Objective Measurement of Voice Channel Intelligibility
AD-A048 611/8CP

An Algorithm for Determining Speech Intelligibility
AD-A055 236/4CP

Research on Diagnostic Evaluation of Speech Intelligibility
AD-755 918/CP

INTERACTIVE GRAPHICS
Program Documentation for the Digital Switching Experiment Program
AD-A030 363/6CP

WCCM Automated Command and Control Support
AD-A033 559/6CP

A Research Program in Computer Technology
AD-A045 673/1CP

An Interactive Graphics Approach to the Flight Deck Handling Problem
AD-778 635/3CP

INTEREQUIPMENT COMMUNICATION
Optimizing Distributed Data Bases -- a Framework for Research
AD-A021 610/1CP

Digital Controller Communication Link
AD-A028 245/9CP

INTERFACE MESSAGE PROCESSORS
The Interface Message Processor Program
AD-A025 358/3CP

The Network Control Center Program
AD-786 134/7CP

The Terminal Interface Message Processor Program
AD-786 135/4CP

INTERFACES
Using British Standard Interfaces to Create a Fast Link Between Two Computers
AD-A052 087/4CP

INTERFERENCE PREDICTION PROCESS
Prediction Routine Studies. Volume II. Intermodulation Analysis
AD-846 961/CP

Prediction Route Studies. Volume III. Field Strength/ Power Density Program
AD-846 962/CP

INTERLISP SYSTEM
Research on Interlisp and Network-Based Systems
AD-A056 579/6CP

INTERMODULATION
Intermodulation Considerations for the GAPFILLER Satellite
AD-A024 831/0CP

INTONATION
Prosodic Aids to Speech Recognition: VI. Timing Cues to Linguistic Structure and Improved Computer Programs for Prosodic Analysis
AD-A010 221/0CP

INVERTER CIRCUITS
Method of Optimization of a Periodic Step Waveform for Minimization of Total Harmonic Distortion
AD-A020 156/6CP

IONOSPHERIC DISTURBANCES
NUCOM/BREM. An Improved HF Propagation Code for Ambient and Nuclear Stressed Ionospheric Environments
AD-A058 867/3CP

WEPH V Code Modifications for HF Propagation and System Performance Modeling
AD-770 053/7CP

The Influence of the Lower Ionosphere on Wave Propagation in the LF Range Up to a Distance of 300 Km
N73-11131/CP

IONOSPHERIC PROPAGATION
A Simplified Mode Conversion Program for VLF Propagation in the Earth-Ionosphere Waveguide
AD-A002 259/0CP

Effective Ionospheric Height for a Simplified Mode Conversion Model at VLF
AD-A020 642/5CP

Modeling of Transionospheric Radio Propagation
AD-A023 197/7CP

Antenna Selection for Ionospheric Telecommunication Systems
AD-A049 549/9CP

NUCOM/BREM. An Improved HF Propagation Code for Ambient and Nuclear Stressed Ionospheric Environments
AD-A058 867/3CP

WEPH V Code Modifications for HF Propagation and System Performance Modeling
AD-770 053/7CP

A Program for Computing Earth Ionosphere ELF/ VLF Excitation Factors for Satellite-Borne Antennas
AD-779 867/1CP

The Numerical Representation of the Critical Frequency of the F1 Region of the Ionosphere
COM-75-10813/4CP

The Influence of the Lower Ionosphere on Wave Propagation in the LF Range Up to a Distance of 300 Km
N73-11131/CP

A Versatile Three-Dimensional Ray Tracing Computer Program for Radio Waves in the Ionosphere
PB-248 856/7CP

Predicting the Performance of High Frequency Sky-Wave Telecommunication Systems (the Use of the HFMUFES 4 Program)
PB-258 556/0CP

IONOSPHERIC SCINTILLATIONS
Modeling of Transionospheric Radio Propagation
AD-A038 132/7CP

IPP (INTERFERENCE PREDICTION PROCESS)
Prediction Routine Studies. Volume II. Intermodulation Analysis
AD-846 961/CP

Prediction Route Studies. Volume III. Field Strength/ Power Density Program
AD-846 962/CP

JET BOMBERS
B-1 EMUX Automated Logic Diagrammer Demonstration Program
AD-A056 964/0CP

JOB SATISFACTION
Final Report
AD-A030 551/6CP

KALMAN FILTERING
Spatial Stochastic Analysis of EMP Transients
AD-A000 825/0CP

Extended Kalman Filtering Applied to the Position Locating and Reporting System (PLRS)
AD-A038 780/3CP

Development of a Configuration Concept of a Speech Digitizer Based on Adaptive Estimation Techniques
AD-773 388/4CP

KLYSTRONS
Transmitter Tube for Troposcatter Application
AD-765 517/8CP

LANDSAT SATELLITES
Technology Forecasting for Space Communication. Task One Report: Cost and Weight Tradeoff Studies for Eos and Tdrs.
N76-16129/8CP

LASER COMMUNICATIONS
High Speed 1.06 Micron Photomultiplier Tubes
AD-920 001/5CP

LAW (JURISPRUDENCE)
State Criminal Justice Telecommunications (Stacom). Volume 4: Network Design Software User'S Guide.
N78-16221/1CP

LIFE CYCLE COSTS
Life Cycle Cost Model
AD-A013 369/4CP

Cost Effectiveness Program Plan for Joint Tactical Communications. Volume III. Life Cycle Costing. Appendix F. Computer Models for LCC
AD-A027 643/6CP

AFSATCOM Life Cycle Cost Model
AD-A056 102/7CP

Cost Effectiveness Program Plan for Joint Tactical Communications. Volume III. Life Cycle Costing. Appendix F. Computer Models for LCC
AD-A056 981/4CP

LINEAR SYSTEMS
Development of Communications Analysis Techniques
N73-16125/CP

LISTS
Spectral Analysis Program (Sap). Volume 2: Programmer'S Manual
N73-26146/3CP

LOADING (ELECTRONICS)
Description of the MILSATCOM Loading Program 'OPAL'
AD-A054 878/4CP

Users Guide for the MILSATCOM Loading Program 'OPAL'
AD-A054 879/2CP

Description of the MILSATCOM Loading Program 'OPAL': GPSCS Addendum
AD-A054 880/0CP

Users Guide for the MILSATCOM Loading Program 'OPAL': GPSCS Addendum
AD-A054 881/8CP

LOCAL GOVERNMENT
The Telecommunication/Data Management System (TCDMS) IBM Assembler Language Computer System Magnetic Tape, Release No. 2
PB-250 763/0CP

TCDMS Utilities Manual (Data Management Section)
PB-250 992/5CP

LOGISTICS
AFSATCOM Life Cycle Cost Model
AD-A056 102/7CP

LOOP ANTENNAS
The Development of a Multiturn Loop Antenna for the AN/PRC-77
AD-A006 929/4CP

LOW FREQUENCIES
The Influence of the Lower Ionosphere on Wave Propagation in the LF Range Up to a Distance of 300 Km
N73-11131/CP

LOW NOISE AMPLIFIERS
Research in Integrated, High-Frequency Communication Circuits
AD-A043 560/2CP

MAGNETIC CARDS
EMC Analytical Models for Programmable Desk Top Calculators
PB-239 680/2CP

MAIL
Framework and Functions of the 'MS' Personal Message System
AD-A048 774/4CP

Study of Electronic Handling of Mail. Completion Report for Work Task 5. Transmission Methods.
AD-715 121/CP

MAIL INPUT CONVERSION
Conversion Subsystems for the Electronic Mail Handling Program. Task II Report, A Digital Simulation Model
PB-235 201/1CP

Conversion Subsystems for the Electronic Mail Handling Program. Task IIIA Report, Evaluation of Data Compression Techniques
PB-235 202/9CP

MAIL OUTPUT RECONVERSION
Conversion Subsystems for the Electronic Mail Handling Program. Task II Report, A Digital Simulation Model
PB-235 201/1CP

Conversion Subsystems for the Electronic Mail Handling Program. Task IIIA Report, Evaluation of Data Compression Techniques
PB-235 202/9CP

MAIL PROCESSING
Conversion Subsystems for the Electronic Mail Handling Program. Task II Report, A Digital Simulation Model
PB-235 201/1CP

Conversion Subsystems for the Electronic Mail Handling Program. Task IIIA Report, Evaluation of Data Compression Techniques
PB-235 202/9CP

MAN COMPUTER INTERFACE
Alpha/Numeric Extraction Technique Phase II
AD-A041 759/2CP

MAN MACHINE SYSTEMS
Interactive Communication Systems Modeling Study
AD-A026 409/3CP

A Digital Simulation Model of Message Handling in the Tactical Operations System. III. Further Extensions of the Model for Increased Interaction
AD-A047 105/2CP

Astronaut/Computer Communication Study Final Report
N71-25922/CP

MANAGEMENT
A Study of Naval Administrative Telephone System Management
AD-A009 903/6CP

MANUALS
Study and Development of a Mathematical Analysis for the Performance Assessment of Space Communication System Parameters Final Report
N71-28162/CP

Information Transfer Satellite Concept Study. Volume 4 Computer Manual
N72-18864/CP

Advanced Communication System Time Domain Modeling Techniques Asystd Software Description. Volume 1 Program Users Guide
N72-30148/CP

Spectral Analysis Program (Sap). Volume 2: Programmer'S Manual
N73-26146/3CP

Earth Terminal Measurement System Operations Manual
PB-284 589/9CP

MARKET RESEARCH

Implementation of User Demand and Satisfaction Model for Personal Radio Services
PB-276 611/1CP

MARS 71 PROJECT

The Deep Space Network, Volume 4 Progress Report, May - Jun. 1971
N71-33163/CP

MATHEMATICAL MODELS

HF Channel Simulator for Wideband Signals. A Mathematical Model and Computer Program for 100-kHz Bandwidth HF Channels
AD-A054 726/5CP

Nonlinear System Modeling and Analysis with Applications to Communications Receivers
AD-766 278/6CP

Information Transfer Satellite Concept Study. Volume 4 Computer Manual
N72-18864/CP

MATHEMATICAL PROGRAMMING

A Multi-Commodity Concave Cost Minimization Problem for Communication Networks
AD-740 119/CP

MESSAGE PROCESSING

Advance Identification of Catastrophic Traffic Build-Up in the Naval Telecommunication Command
AD-A015 960/8CP

The 'Standard' MUX Bus: Some Constraints on Information Flow Arising from MIL-STD-1553 (USAF)
AD-A017 677/6CP

Distributed Computation and TENEX-Related Activities
AD-A018 660/1CP

Interface Message Processors for the ARPA Computer Network
AD-A020 480/0CP

Distributed Computation and TENEX-Related Activities
AD-A022 380/0CP

The Interface Message Processor Program
AD-A025 358/3CP

Computer Software for the Navy K-Band Satellite Communications Terminal
AD-A027 220/3CP

An Experimental Implementation of a FORMAT D Message Analyser by Syntactic Specification
AD-A028 934/8CP

The Terminal Interface Message Processor Program
AD-A031 617/4CP

The Terminal Interface Message Processor Program
AD-A038 344/8CP

The Interface Message Processor Program
AD-A040 675/1CP

An Implementation of the MSG Interprocess Communication Protocol
AD-A041 630/5CP

The ARPANET/TENEX Primer and the MSG Message Handling Program
AD-A042 740/1CP

A Computer Model for Simulation of Message Processing in Military Exercise Control and Evaluation Systems
AD-A045 832/3CP

State Deltas: A Formalism for Representing Segments of Computation
AD-A046 273/9CP

A Digital Simulation Model of Message Handling in the Tactical Operations System. III. Further Extensions of the Model for Increased Interaction
AD-A047 105/2CP

Framework and Functions of the 'MS' Personal Message System
AD-A048 774/4CP

Single-Channel Voice-Response-System Program Documentation. Volume I. System Description
AD-A051 543/7CP

Tactical Routing Indicator Look-Up and Header Preparation Device (TACRAHD)
AD-771 958/6CP

Operating Characteristics for Detection of a Fading Signal in M Alternative Locations with D-Fold Diversity
AD-786 371/5CP

MESSAGE TRAFFIC

An Experimental Implementation of a FORMAT D Message Analyser by Syntactic Specification
AD-A028 934/8CP

METEOR TRAILS

Equipment for Experimental Study of Communication Via Meteor Track
N71-26533/CP

MICROPROCESSORS

TELNET under Single-Connection TCP Specification
AD-A024 821/1CP

A Microprocessor-Controlled Interface for Burst Processing
AD-A030 226/5CP

Microprocessor Utilization in Communications System Monitoring
AD-A042 145/3CP

MICROPROGRAMMING

AN/UYK-17(XB-1)(V) Signal Processing Element Microprogramming Support Software
AD-A016 806/2CP

MICROWAVE AMPLIFIERS

Phased Array Antenna Amplifier Exploratory Development Model (100 watts)
AD-A056 173/8CP

MICROWAVE COMMUNICATION

An Automated Procedure for Predicting Potential Electromagnetic Interference between Space and Terrestrial Systems Within the Coordination Areas in the Bands between 7.25 and 8.4 GHz
PB-261 229/9CP

MICROWAVE COMMUNICATIONS

Cross Polarization Techniques Investigation
AD-A043 395/3CP

Computer Software for EWCS Performance Prediction
AD-A049 211/6CP

MICROWAVE NETWORKS

A Calculator Controlled Microwave Network Analyzer System
AD-A040 014/3CP

MICROWAVE RELAY SYSTEMS

Convolution Method of Interference Calculation. User's Manual and Results
PB-241 306/0CP

MILITARY PROCUREMENT

Economic Analysis of Selected Test Measurement and Diagnostic Equipment from the U.S. Army Communications Command Preferred Items List. Volume 2. Technical Report
AD-A052 161/7CP

MILITARY SATELLITES

Description of the MILSATCOM Loading Program 'OPAL'
AD-A054 878/4CP

Users Guide for the MILSATCOM Loading Program 'OPAL'
AD-A054 879/2CP

Description of the MILSATCOM Loading Program 'OPAL': GPSCS Addendum
AD-A054 880/0CP

Users Guide for the MILSATCOM Loading Program 'OPAL': GPSCS Addendum
AD-A054 881/8CP

MINICOMPUTERS

Design Specification for AFCS Universal Performance Assessment and Control System
AD-A040 926/8CP

Framework and Functions of the 'MS' Personal Message System
AD-A048 774/4CP

MOBILE EQUIPMENT

Incorporation of Monitoring Data in the Frequency Assignment Process of the FCC Spectrum Management Task Force
PB-234 530/4CP

MOBILE SPECTRUM MONITORING UNITS

Incorporation of Monitoring Data in the Frequency Assignment Process of the FCC Spectrum Management Task Force
PB-234 530/4CP

MODE LOCKED LASERS

High Speed Electronic Bit Synchronizer
AD-908 863/4CP

MODELS-SIMULATION

EMC Analytical Models for Programmable Desk Top Calculators
PB-239 680/2CP

MODEMS

Performance of Digital Modems with Cochannel Interference and Gaussian Noise
PB-251 961/9CP

MONITORS

Performance Monitors for Digital Communications Systems
AD-A005 171/4CP

ATEC Digital Adaptation Study. Volume III. Summary and Recommendations
AD-A033 716/2CP

MORSE CODE

Processing of the Manual Morse Signal Using Optimal Linear Filtering, Smoothing and Decoding
AD-A019 493/6CP

MULTICHANNEL COMMUNICATIONS

SCCU/MCCU Characteristics for Autodin II
AD-A037 214/4CP

HF Channel Simulator for Wideband Signals. A Mathematical Model and Computer Program for 100-kHz Bandwidth HF Channels
AD-A054 726/5CP

Energy Use for the Autoregressive Channel with Noiseless Feedback: Numerican Study
AD-923 122/6CP

MULTICS SYSTEM

Security Kernel Evaluation for Multics and Secure Multics Design, Development and Certification
AD-A038 261/4CP

Design and Abstract Specification of a Multics Security Kernel. Volume I
AD-A048 576/3CP

MULTIPATH TRANSMISSION

UHF Multipath Phenomena in a Marine Environment
COM-75-10266/5CP

MULTIPLE ACCESS

Unique Words for Identification and Synchronization in TDMA Satellite Communications Systems
AD-784 762/7CP

MULTIPLE BEAM ANTENNAS

Multiple Beam Torus Antenna Study. Volume II
AD-A047 158/1CP

MULTIPLEXING

Computer Simulation of MUX Bus Voltage Waveforms under Steady State Conditions
AD-A013 107/8CP

Multiplex Simulator Design Study
AD-A037 226/8CP

B-1 EMUX Automated Logic Diagrammer Demonstration Program
AD-A056 964/0CP

MULTIPROCESSORS

Parallelism in AI Problem Solving: A Case Study of Hearsay II
AD-A025 159/5CP

X-SIM. A Dynamic Communications Simulator for the X-Tree Network Report and User's Manual
AD-A055 945/0CP

NATURAL RESOURCES

Wilderness Area Simulation Model - User's Manual
PB-233 364/9CP

Wilderness Area Simulation Model
PB-233 488/6CP

NAVAL OPERATIONS

Decision Analysis as an Element in an Operational Decision Aiding System (Phase IV)
AD-A045 083/3CP

NEODYMIUM LASERS

High Speed 1.06 Micron Photomultiplier Tubes
AD-920 001/5CP

NETDEN COMPUTER PROGRAM

NETDEN: An Interactive Network Design Graphics Simulation
AD-A029 225/0CP

NETWORK ANALYSIS THEORY

Multicommodity Network Plotting via Program NETPLT
COM-74-50634/6CP

NETWORK FLOWS

Some New Algorithms for Deterministic and Probabilistic Communication Networks
AD-785 119/9CP

NETWORK SYNTHESIS

A Multi-Commodity Concave Cost Minimization Problem for Communication Networks
AD-740 119/CP

NETWORKS

PROXVAL Program Description
AD-A022 141/6CP

The ARPANET/TENEX Primer and the MSG Message Handling Program
AD-A042 740/1CP

Development of New Techniques for Cost-Effective Network Designs
AD-913 995/7CP

Gospre: A Simple Analytical Program for Computing Grade of Service in a Heavily Loaded Communications Network.
N75-29301/9CP

NOISE

Noise Immunity in Digital Communication by Use of Orthogonal Signal Correlation and Walsh Functions.
LA-5896

NONLINEAR SYSTEMS
Analytic Techniques for Processing Signal and Noise Through a Non-Linear Channel Using Modsim. Volume 2: Software Description.
N77-18784/7CP

NONPARAMETRIC STATISTICS
The Effect of an Interfering Signal on the Performance of Nonparametric Detectors Using Spectral Estimates
AD-A052 350/6CP

NUCLEAR EXPLOSION DAMAGE
Avoidance of Collateral Blast Damage to Increase Survivability of Military Telecommunications Networks
AD-A030 462/6CP

NUCLEAR EXPLOSIONS
The ROSCOE Manual. Volume 20 - Satellite Communication Model
AD-A047 918/8CP

WEPH V Code Modifications for HF Propagation and System Performance Modeling
AD-770 053/7CP

NUCLEAR RADIATION
The ROSCOE Manual. Volume 20 - Satellite Communication Model
AD-A047 918/8CP

OPAL COMPUTER PROGRAM
Description of the MILSATCOM Loading Program 'OPAL'
AD-A054 878/4CP

Users Guide for the MILSATCOM Loading Program 'OPAL'
AD-A054 879/2CP

Description of the MILSATCOM Loading Program 'OPAL': GPSCS Addendum
AD-A054 880/0CP

Users Guide for the MILSATCOM Loading Program 'OPAL': GPSCS Addendum
AD-A054 881/8CP

OPERATING SYSTEMS (COMPUTERS)
Distributed Computation Study
AD-A024 670/2CP

Summary of the System, Support, and Special-Purpose Software Used by the Sanguine Simulation Facility
AD-753 115/CP

OPTICAL COMMUNICATION
Study of Atmospheric Effects on Laser Communications Systems. Volume 2 - Atmospheric Effects on Wave Propagation at 10.6 Microns Interim Report
N71-26419/CP

OPTICAL COMMUNICATIONS
Fiber Optics Design Aid Package
AD-A040 772/6CP

Operational and Cost Considerations in the Use of Optical Waveguides in a Local Information Transfer System
AD-A053 600/3CP

High Speed Electronic Bit Synchronizer
AD-908 863/4CP

OPTICAL TRACKING
A Computer Program for Evaluating Radio Signal Propagation from Artificial Earth Satellites.
N70-27491/CP

OPTICAL WAVEGUIDES
Operational and Cost Considerations in the Use of Optical Waveguides in a Local Information Transfer System
AD-A053 600/3CP

ORBIT CALCULATION
Significant Accomplishments in Technology, Goddard Space Flight Center, 1970
N72-25755/CP

OUTDOOR RECREATION
Wilderness Area Simulation Model - User's Manual
PB-233 364/9CP

Wilderness Area Simulation Model
PB-233 488/6CP

P CODES
Applications of Computer-Generated Perspective Plots.
LA-UR-74-509

PACKET RADIO NETWORKS
ARPA Internetwork Protocols Project Status Report
AD-A024 819/5CP

Single-Connection TCP Specification (Preliminary Documentation)
AD-A024 820/3CP

TELNET under Single-Connection TCP Specification
AD-A024 821/1CP

TCP Resynchronization
AD-A024 822/9CP

ARPA Internetwork Protocols Project Status Report
AD-A024 823/7CP

PACKETS
ARPA Internetwork Protocols Project Status Report
AD-A024 819/5CP

Single-Connection TCP Specification (Preliminary Documentation)
AD-A024 820/3CP

TELNET under Single-Connection TCP Specification
AD-A024 821/1CP

TCP Resynchronization
AD-A024 822/9CP

ARPA Internetwork Protocols Project Status Report
AD-A024 823/7CP

PARABOLIC ANTENNAS
Rooftop Antenna Pointing Program
AD-A047 999/8CP

EMP Response of Parabolic Reflector Antennas
AD-776 399/8CP

PARALLEL PROCESSING
Parallelism in AI Problem Solving: A Case Study of Hearsay II
AD-A025 159/5CP

PARSERS
A Locally-Organized Parser for Spoken Input
AD-A006 310/7CP

PATTERN RECOGNITION
Voice Input Code Identifier (VICI)
AD-A040 994/6CP

Advantages of Quick-Look Pattern Recognition in Air Force Signal Analysis.
AD-712 102/CP

PERFORMANCE PREDICTION
A Model for Calculating Expected Performance of the APOLLO Unified S-Band (Usb) Communication System
N72-18159/CP

Performance Analysis of Psk Signals Through Fading Channels.
N77-18320/0CP

PERFORMANCE TESTS
Study and Development of a Mathematical Analysis for the Performance Assessment of Space Communication System Parameters Final Report
N71-28162/CP

PHASE LOCKED COMMUNICATIONS
Revision to the Frequency Tracking and Estimation Program (Phase-Locked Loop)
AD-780 461/0CP

PHASE LOCKED SYSTEMS
Revision to the Frequency Tracking and Estimation Program (Phase-Locked Loop)
AD-780 461/0CP

Phase-Lock Loop Models for Systid Simulations, Volume 4.
N78-23271/7CP

PHASE MODULATION
A Fortran HF Channel Simulator and HF Channel Effects on Performance of Multitone Modems
AD-A003 275/5CP

Error Rate Analysis of M-ary Transmitted Reference Systems Using the Sunds Troposcatter Model
AD-813 738/CP

PHASE SHIFT KEYING
Performance Analysis of Psk Signals Through Fading Channels.
N77-18320/0CP

PHASED ARRAYS
Phased Array Antenna Amplifier Exploratory Development Model (100 watts)
AD-A056 173/8CP

PHONEMES
Computer Identification of Phonemes in Continuous Speech
AD-A034 274/1CP

Phonemic Category Experiments
AD-A055 364/4CP

Phonemic Category Experiments
AD-B004 707/6CP

PHONETICS
Prosodic Aids to Speech Recognition: VI. Timing Cues to Linguistic Structure and Improved Computer Programs for Prosodic Analysis
AD-A010 221/0CP

Voice Input Code Identifier (VICI)
AD-A040 994/6CP

PHONOLOGY
A Speech Processing System
AD-A004 158/2CP

PHOTOCOMPOSITION
Convert Ebcdic Photon Typesetter Drive Tapes to Tts Code.
PB-266 790/5CP

PHOTOMULTIPLIER TUBES
High Speed 1.06 Micron Photomultiplier Tubes
AD-920 001/5CP

PHOTON PACESETTER MARK 2
Convert Ebcdic Photon Typesetter Drive Tapes to Tts Code.
PB-266 790/5CP

PHOTOTYPESETTING
Convert Ebcdic Photon Typesetter Drive Tapes to Tts Code.
PB-266 790/5CP

PIONEER SPACE PROBES
The Deep Space Network, Volume 4 Progress Report, May - Jun. 1971
N71-33163/CP

PLOTTERS
Applications of Computer-Generated Perspective Plots.
LA-UR-74-509

A Contribution to Computer Typesetting Techniques: Tables of Coordinates for Hershey's Repertory of Occidental Type Fonts and Graphic Symbols
PB-251 845/4CP

PLOTTING
Multicommodity Network Plotting via Program NETPLT
AD-783 954/1CP

PLURIBUS SATELLITE
Combined Quarterly Technical Report No. 9. Volume 1. Packet Broadcast by Satellite PLURIBUS Satellite IMP Development UNIX System Development
AD-A055 438/6CP

POSITION LOCATION REPORTING SYSTEM
Extended Kalman Filtering Applied to the Position Locating and Reporting System (PLRS)
AD-A038 780/3CP

POWER SPECTRA
Generation of a Stationary Gaussian Random Process with a Specified Power Spectral Density Function
AD-A031 725/5CP

Spectral Analysis Program. Volume 1: User'S Guide
N73-26145/5CP

PREPROCESSING
COMMEL II User's Manual. Volume III. Appendixes
AD-A031 615/8CP

PRINTERS (DATA PROCESSING)
Optimal Printer Configuration with Multiplex General Address Reading Device
AD-769 388/0CP

PROGRAMMING (COMPUTERS)
Summary of the System, Support, and Special-Purpose Software Used by the Sanguine Simulation Facility
AD-753 115/CP

PROGRAMMING LANGUAGES
Communications Oriented Language (COL): Language Definition
AD-A047 392/6CP

Communications Oriented Language (COL): Language Implementation and Usage
AD-A047 393/4CP

PROGRAMMING MANUALS
TENEX MSG User Manual
AD-A039 599/6CP

Automated Computing and Plotting of Geostationary Satellite Earth Footprints: Program Footprints User's Manual
PB-267 953/8CP

Power and Beam Pointing Restrictions for Geostationary Orbit Avoidance: Program ORBITCHECK User's Manual
PB-268 027/0CP

PROSODIC ANALYSIS
Prosodic Aids to Speech Recognition: VI. Timing Cues to Linguistic Structure and Improved Computer Programs for Prosodic Analysis
AD-A010 221/0CP

PROTECTION
Encapsulation: An Approach to Operating System Security
AD-771 758/0CP

PROTOCOLS
ARPA Internetwork Protocols Project Status Report
AD-A024 819/5CP

Single-Connection TCP Specification (Preliminary Documentation)
AD-A024 820/3CP

TELNET under Single-Connection TCP Specification
AD-A024 821/1CP

TCP Resynchronization
AD-A024 822/9CP

ARPA Internetwork Protocols Project Status Report
AD-A024 823/7CP

PULSE CODE MODULATION
Error Rate Analysis of M-ary Transmitted Reference Systems Using the Sunds Troposcatter Model
AD-813 738/CP

SUBJECT INDEX

PULSE COMMUNICATION

Analysis of a Digital Telecommunications Message Model
PB-252 184/7CP

Confidence Limits for Digital Error Rates from Dependent Transmissions
PB-267 777/1CP

PULSE COMMUNICATIONS

Performance Monitors for Digital Communications Systems Part II
AD-A004 211/9CP

Minimal Rate Digital Voice Transmission
AD-A004 975/9CP

Performance Monitors for Digital Communications Systems
AD-A005 171/4CP

Application of the Computer for Real Time Encoding and Decoding of Cyclic Block Codes
AD-A021 818/0CP

DEMOD/Decoder Integration
AD-A053 685/4CP

PULSES

Analysis of Jitter Characteristics in a Pulse Stuffing TDM Network
AD-A049 310/6CP

QUEUEING THEORY

A Unified Approach to Modelling Loop Service Systems: A Preliminary Report
AD-A021 940/2CP

EON Models for the Analysis and Design of a Computer Network of Functionalized Processors
AD-A045 721/8CP

Congestion in a System of N Service Centers with Interference
AD-787 441/5CP

RADAR BEACONS

Development of a Discrete Address Beacon System
AD-A046 580/7CP

RADIATION ATTENUATION

Computer Software for EWCS Performance Prediction
AD-A049 211/6CP

RADIO ATTENUATION

Prediction of Attenuation of the 28 Ghz Comstar Beacon Signal Using Radar and Measured Rain Drop Spectra.
N78-30483/9CP

RADIO BEAMS

PERDIS. A Computer Program to Determine if Two Antenna Beams Intersect and Provide the Perpendicular Distance Between the Beam Axes
PB-221 257/9CP

RADIO BROADCASTING

Advance Identification of Catastrophic Traffic Build-Up in the Naval Telecommunication Command
AD-A015 960/8CP

PERDIS Bearing and Distance Computer Program
PB-210 582/CP

PERDIS. A Computer Program to Determine if Two Antenna Beams Intersect and Provide the Perpendicular Distance Between the Beam Axes
PB-221 257/9CP

Field Strength Calculation for TV and FM Broadcasting (Computer Program TVFMFS)
PB-249 144/7CP

TV and FM Broadcasting Field Strength (TVFMFS) Computer Program
PB-251 129/3CP

RADIAT Computer Program
PB-260 426/2CP

A User's Guide to RADIAT, CONTOUR, CLIPPING, SKYWAVE
PB-260 427/0CP

RADIO COMMUNICATION

Modeling the Service Quality of Consolidated Coast Guard 500 kHz Operations
COM-75-10795/3CP

The Economic Comparison of One-Way Paging and Full Two-Way Radio Service
COM-75-11141/9CP

Equipment for Experimental Study of Communication Via Meteor Track
N71-26533/CP

A Model for Calculating Expected Performance of the APOLLO Unified S-Band (Usb) Communication System
N72-18159/CP

Implementation of User Demand and Satisfaction Model for Personal Radio Services
PB-276 611/1CP

RADIO COMMUNICATION SYSTEMS

Prediction Routine Studies. Volume I. Sample Problems and Frequency Band Analysis
AD-846 957/CP

Prediction Routine Studies. Volume II. Intermodulation Analysis
AD-846 961/CP

Prediction Route Studies. Volume III. Field Strength/Power Density Program
AD-846 962/CP

Feasibility Model Development of the 61-kHz Subsystem of the Decision Information Distribution System
COM-75-10792/0CP

RADIO EQUIPMENT

Life Cycle Cost Model
AD-A013 369/4CP

Single Channel Ground and Airborne Radio Systems (SINCGARS) Evaluation Model
AD-A019 550/3CP

High Frequency (HF) Amplitude Modulation (AM) Signal-to-Interference Ratio (SIR) Study
AD-A040 948/2CP

RADIO FREQUENCY INTERFERENCE

A Study of Interference in Satellite Broadcasting.
N78-17281/4CP

RADIO INTERFERENCE

Prediction Routine Studies. Volume I. Sample Problems and Frequency Band Analysis
AD-846 957/CP

Prediction Routine Studies. Volume II. Intermodulation Analysis
AD-846 961/CP

Prediction Route Studies. Volume III. Field Strength/Power Density Program
AD-846 962/CP

RADIO LINKS

ARPA Internetwork Protocols Project Status Report
AD-A024 819/5CP

Single-Connection TCP Specification (Preliminary Documentation)
AD-A024 820/3CP

TELNET under Single-Connection TCP Specification
AD-A024 821/1CP

TCP Resynchronization
AD-A024 822/9CP

ARPA Internetwork Protocols Project Status Report
AD-A024 823/7CP

Antenna Selection for Ionospheric Telecommunication Systems
AD-A049 549/9CP

DEMOD/Decoder Integration
AD-A053 685/4CP

Performance of Soft Limiting PSK and DPSK Spread Spectrum Systems
AD-777 897/0CP

RADIO PAGING SYSTEMS

The Economic Comparison of One-Way Paging and Full Two-Way Radio Service
COM-75-11141/9CP

RADIO RECEIVERS

Advanced Receiver Modeling Methods
AD-A048 041/8CP

Nonlinear System Modeling and Analysis with Applications to Communications Receivers
AD-766 278/6CP

A Study of (AFCS) Communications Measurement Program
AD-775 163/9CP

Adjacent Channel Interference Analysis
AD-850 385/CP

RADIO RECEPTION

Advanced VLF/LF Receive System Developed under the Tri Service Propagation Program
AD-A021 233/2CP

Propagation Model (0.1 to 20 GHz) Extensions for 1977 Computer Programs
AD-A055 605/0CP

RADIO RELAY STATIONS

User's Manual for COORD (FCC Coordination Contour Program for Domestic Satellite Earth Stations)
PB-240 199/0CP

FCC Coordination Contour Program for Domestic Satellite Earth Stations
PB-241 628/7CP

RADIO RELAY SYSTEMS

Models for Message Transmissions and Interference-Caused Retransmission through a Multi-Channel Satellite Communications System
AD-736 115/CP

Geostationary Orbit Avoidance Computer Program
PB-211 500/CP

Geostationary Orbit Avoidance Computer Program (Card Deck)
PB-211 501/CP

Earth Terminal Measurement System Operations Manual
PB-284 589/9CP

A Demand Assignment Multiple Access (DAMA) Control System for Thin-Route Satellite Telephone Systems
PB-286 162/3CP

RADIO SIGNALS

A Computer Program for Evaluating Radio Signal Propagation from Artificial Earth Satellites.
N70-27491/CP

RADIO STATIONS

RADIAT Computer Program
PB-260 426/2CP

RADIO TELEMETRY

The Deep Space Network, Volume 4 Progress Report, May - Jun. 1971
N71-33163/CP

RADIO TRANSMISSION

A Simplified Mode Conversion Program for VLF Propagation in the Earth-Ionosphere Waveguide
AD-A002 259/0CP

A Fortran HF Channel Simulator and HF Channel Effects on Performance of Multitone Modems
AD-A003 275/5CP

Modeling of Transionospheric Radio Propagation
AD-A023 197/7CP

HF Channel Simulation
AD-A027 429/0CP

Modeling of Transionospheric Radio Propagation
AD-A038 132/7CP

Applications Guide for Propagation and Interference Analysis Computer Programs (0.1 to 20 GHz)
AD-A053 242/4CP

A New Satellite Multiple Access Technique.
AD-713 674/CP

FOREST - A Computer Program to Compute Radio Loss Between Two Antennas Embedded in a Forest Environment
AD-777 501/8CP

Error Rate Analysis of M-ary Transmitted Reference Systems Using the Sunds Troposcatter Model
AD-813 738/CP

LF/VLF Propagation Analysis Computer Program Documentation
AD-846 735/CP

A User's Guide to Path Loss Computations
COM-72-11297/CP

Research and Development Contract for Coal Mine Communication System. Volume 3. Theoretical Data Base
PB-244 899/1CP

A Program Description of 'Orbit - Prints'; Contours of Power Density at the Geostationary Orbit
PB-271 815/3CP

RADIO TRANSMITTERS

Transmitter Tube for Troposcatter Application
AD-765 517/8CP

RADIO WAVE REFRACTION

A Computer Program for Evaluating Radio Signal Propagation from Artificial Earth Satellites.
N70-27491/CP

RADIO WAVES

A New Method for Predicting HF Ground Wave Attenuation Over Inhomogeneous, Irregular Terrain
AD-721 179/CP

The Influence of the Lower Ionosphere on Wave Propagation in the LF Range Up to a Distance of 300 Km
N73-11131/CP

RADIOFREQUENCY INTERFERENCE

Probabilistic Interference Prediction Model-Computer Programs
AD-A011 453/8CP

High Frequency (HF) Amplitude Modulation (AM) Signal-to-Interference Ratio (SIR) Study
AD-A040 948/2CP

The Effect of an Interfering Signal on the Performance of Nonparametric Detectors Using Spectral Estimates
AD-A052 350/6CP

Interference Mitigation Studies for Texas Telephone and Power Distribution Systems
AD-768 072/1CP

LF/VLF Propagation Analysis Computer Program Documentation
AD-846 735/CP

Adjacent Channel Interference Analysis
AD-850 385/CP

Calculations of Interference Potential Between Geostationary Satellite Networks: Program WARC 71.A29 User's Manual
COM-74-10752/5CP

PERDIS. A Computer Program to Determine if Two Antenna Beams Intersect and Provide the Perpendicular Distance Between the Beam Axes
PB-221 257/9CP

Convolution Method of Interference Calculation. User's Manual and Results
PB-241 306/0CP

Satellite System Interference Modeling (11.7-12.2 GHz)
PB-258 737/6CP

An Automated Procedure for Predicting Potential Electromagnetic Interference between Space and Terrestrial Systems Within the Coordination Areas in the Bands between 7.25 and 8.4 GHz
PB-261 229/9CP

An Automated Technique for Calculating Interference from Airborne Transmitters to Terrestrial Receivers
PB-264 519/0CP

Power and Beam Pointing Restrictions for Geostationary Orbit Avoidance: Program ORBITCHECK User's Manual
PB-268 027/0CP

RADIOFREQUENCY MANAGEMENT
Power and Beam Pointing Restrictions for Geostationary Orbit Avoidance: Program ORBITCHECK User's Manual
PB-268 027/0CP

RADOMES
URLIM - A Unified Radome Limitations Computer Program. Volume 2. User's Guide
AD-A057 459/0CP

RAINDROPS
Prediction of Attenuation of the 28 Ghz Comstar Beacon Signal Using Radar and Measured Rain Drop Spectra.
N78-30483/9CP

RANDOM NOISE
Analytic Techniques for Processing Signal and Noise Through a Non-Linear Channel Using Modsim. Volume 2: Software Description.
N77-18784/7CP

RAY TRACING
A Versatile Three-Dimensional Ray Tracing Computer Program for Radio Waves in the Ionosphere
PB-248 856/7CP

RECEIVERS
Interactive Digital Receiver Simulator (IDRS) System User's Manual and Software Documentation
AD-A053 684/7CP

Vlf Receiver Calibration.
N74-19103/2CP

RECORDING INSTRUMENTS
Automatic Speech Level Meter
N73-31402/3CP

RECTIFIERS
Method of Optimization of a Periodic Step Waveform for Minimization of Total Harmonic Distortion
AD-A020 156/6CP

REDUNDANT COMPONENTS
Redundant Ring Structures for Shipboard Distributed Computer Systems
AD-A035 886/1CP

RELIABILITY (ELECTRONICS)
SYMRAP -- A Symbolic Reliability Analysis Program
AD-A013 730/7CP

REMOTE TERMINALS
FAA Remote Terminal System
AD-A054 604/4CP

RESCUE OPERATIONS
Evaluation of Experimental and Developmental Communication Systems Used in Underground Coal Mines. Performance of Trapped-Miner Communication System
PB-274 683/2CP

RESYNCHRONIZATION
TCP Resynchronization
AD-A024 822/9CP

ROSCOE COMPUTER PROGRAM
The ROSCOE Manual. Volume 20 - Satellite Communication Model
AD-A047 918/8CP

ROUTING
Improvements in Routing for Packet-Switched Networks
AD-A006 652/2CP

SATELLITE ANTENNAS
Significant Accomplishments in Technology, Goddard Space Flight Center, 1970
N72-25755/CP

SATELLITE ATTITUDE CONTROL
Significant Accomplishments in Technology, Goddard Space Flight Center, 1970
N72-25755/CP

SATELLITE-BORNE INSTRUMENTS
Significant Accomplishments in Technology, Goddard Space Flight Center, 1970
N72-25755/CP

SATELLITE COMMUNICATIONS
Interface Message Processors for the ARPA Computer Network
AD-A020 480/0CP

Definition of Real-Time Adaptive Control (RTAC) of the Defense Satellite Communications System (DSCS). Volume V. Computer Program Description and Development for a Real-Time Adaptive Control Study
AD-A034 509/0CP

High Altitude Satellite Communications, with Cross-links
AD-A037 118/7CP

Multiple Beam Torus Antenna Study. Volume II
AD-A047 158/1CP

The ROSCOE Manual. Volume 20 - Satellite Communication Model
AD-A047 918/8CP

A Program for Computing Earth Ionosphere ELF/VLF Excitation Factors for Satellite-Borne Antennas
AD-779 867/1CP

Unique Words for Identification and Synchronization in TDMA Satellite Communications Systems
AD-784 762/7CP

SATELLITE NETWORKS
Combined Quarterly Technical Report No. 9. Volume 1. Packet Broadcast by Satellite PLURIBUS Satellite IMP Development UNIX System Development
AD-A055 438/6CP

Combined Quarterly Technical Report Number 9. Volume 2. Private Line Interface Development Packet Network Security
AD-A055 439/4CP

SATELLITE TELEVISION
A Study of Interference in Satellite Broadcasting.
N78-17281/4CP

SATELLITE TRACKING
Ionospheric Effects on the Doppler Frequency Shift in Sarsat Propagation.
N78-21334/5CP

SATELLITE TRACKING SYSTEMS
Rooftop Antenna Pointing Program
AD-A047 999/8CP

SATELLITE TRANSMISSION
Data Collection Operational Support System, Part 1.
N76-22246/2CP

SCIENTIFIC SATELLITES
Simulation Studies for NOAA Stabilized Compensation Program
COM-74-10517/2CP

SCINTILLATION
Modeling of Transionospheric Radio Propagation
AD-A023 197/7CP

Study of Atmospheric Effects on Laser Communications Systems. Volume 2 - Atmospheric Effects on Wave Propagation at 10.6 Microns Interim Report
N71-26419/CP

SECRET COMMUNICATION SYSTEMS
The Performance of 31 and 127 Bit Elastic Surface Wave Encoders and Decoders
AD-762 910/CP

SECURE COMMUNICATIONS
Codex Speech Digitizer Advanced Development Model
AD-A031 509/3CP

Adaptive Multilevel 16KB/S Speech Coder
AD-A031 516/8CP

Security Kernel Evaluation for Multics and Secure Multics Design, Development and Certification
AD-A038 261/4CP

Security Kernel Specification for a Secure Communications Processor
AD-A045 452/0CP

A Research Program in Computer Technology
AD-A045 673/1CP

Design and Abstract Specification of a Multics Security Kernel. Volume I
AD-A048 576/3CP

Multics Security Kernel Validation: Proof Description. Volume I
AD-A056 901/2CP

SECURITY KERNEL
Minimizing the Naming Facilities Requiring Protection in a Computing Utility
AD-A031 909/5CP

SECURITY KERNELS
Design and Abstract Specification of a Multics Security Kernel. Volume I
AD-A048 576/3CP

SELECTIVE CALLING SYSTEMS
Selective Calling Device for the Mobile Maritime Service
AD-769 434/2CP

SEMANTICS
Speech Understanding Systems. Volume IV. Syntax and Semantics
AD-A035 277/3CP

SEQUENTIAL ESTIMATION
Development of a Configuration Concept of a Speech Digitizer Based on Adaptive Estimation Techniques
AD-773 388/4CP

SIGNAL DETECTION
Adaptive Optimum Array Tracking Detectors
AD-A016 590/2CP

Relationships Between Detection and Estimation: Scalar and Array Processing
AD-A030 029/3CP

SIGNAL ENCODING
Performance Analysis of Viterbi Decoding of Convolutional Coded Data Transmitted over a Non-Linear Channel Using Modsim. Volume 1: Theory and Test Cases.
N77-18318/4CP

Study of Spread Spectrum and Convolutional Code Techniques. Volume 2: Software Descriptions.
N77-18319/2CP

SIGNAL PROCESSING
Spatial Stochastic Analysis of EMP Transients
AD-A000 825/0CP

Using a Two-Dimensional Discrete Hilbert Transform to Factor Two-Dimensional Polynomials
AD-A007 719/8CP

Adaptive Optimum Array Tracking Detectors
AD-A016 590/2CP

The CASPERS Linguistic Analysis System
AD-A016 701/5CP

AN/UYK-17(XB-1)(V) Signal Processing Element Microprogramming Support Software
AD-A016 806/2CP

Two-Dimensional Digital Filtering and Its Uncorrelated Error Analysis
AD-A017 592/7CP

Processing of the Manual Morse Signal Using Optimal Linear Filtering, Smoothing and Decoding
AD-A019 493/6CP

Speech Signal Processing Research
AD-A020 489/1CP

Signal Analysis and Parametrization for EMP Data
AD-A020 493/3CP

Speech Signal Processing Research. Appendices 1 thru 9
AD-A022 589/6CP

Segmentation and Labeling of Speech: A Comparative Performance Evaluation
AD-A025 094/4CP

Relationships Between Detection and Estimation: Scalar and Array Processing
AD-A030 029/3CP

Generation of a Stationary Gaussian Random Process with a Specified Power Spectral Density Function
AD-A031 725/5CP

Speech Understanding Systems. Volume I. Introduction and Overview
AD-A035 165/0CP

Speech Understanding Systems. Volume II. Acoustic Front End
AD-A035 166/8CP

Speech Understanding Systems. Volume III. Lexicon, Lexical Retrieval and Control
AD-A035 167/6CP

Speech Understanding Systems. Volume IV. Syntax and Semantics
AD-A035 277/3CP

Speech Understanding Systems. Volume V. Trip
AD-A035 278/1CP

Data Analysis for Stochastic Processes
AD-A038 356/2CP

Constant-Q Spectral Analysis by Means of an Approximate Fast Fourier Transform Technique
AD-A040 813/8CP

Key Word Classification
AD-A044 605/4CP

Phase-Difference Processing Incorporating Time-Alignment and Time-Compression Techniques
AD-A046 797/7CP

The Development of a Computer Speech Processing System and Its Use for the Study and Development of Processing Methods for Enhancing the Intelligibility of Speech in Noise
AD-A047 240/7CP

Interactive Digital Receiver Simulator (IDRS) System User's Manual and Software Documentation
AD-A053 684/7CP

Investigation of the Propagation Stability of a Time Spread Underwater Acoustic Channel
AD-778 683/3CP

Error Probability Characteristics for Uncoded F-out-of-A Communication with D-Fold Diversity
AD-783 037/5CP

Operating Characteristics for Detection of a Fading Signal in M Alternative Locations with D-Fold Diversity
AD-786 371/5CP

Performance Analysis of Psk Signals Through Fading Channels.
N77-18320/0CP

Analytic Techniques for Processing Signal and Noise Through a Non-Linear Channel Using Modsim. Volume 2: Software Description.
N77-18784/7CP

SIGNAL PROPAGATION PATHS
Advanced Receiver Modeling Methods
AD-A048 041/8CP

SIGNAL TO NOISE RATIOS
Study of Atmospheric Effects on Laser Communications Systems. Volume 2 - Atmospheric Effects on Wave Propagation at 10.6 Microns Interim Report
N71-26419/CP

Link Analysis Program Linkan. Volume 1: Theoretical and Programmer'S Manual.
N78-31350/9CP

SIGNALS
Advantages of Quick-Look Pattern Recognition in Air Force Signal Analysis.
AD-712 102/CP

Selective Calling Device for the Mobile Maritime Service
AD-769 434/2CP

SIMULATORS
Interactive Digital Receiver Simulator (IDRS) System User's Manual and Software Documentation
AD-A053 684/7CP

HF Channel Simulator for Wideband Signals. A Mathematical Model and Computer Program for 100-kHz Bandwidth HF Channels
AD-A054 726/5CP

Wireline Simulator
AD-866 966/CP

SLANT TRANSFORMATION
Slant Transform Image Coding
AD-767 758/6CP

SOCIAL COMMUNICATION
Proximity: Location, Time, and Opportunity to Communicate
AD-A011 151/8CP

SOFTWARE
FCC Coordination Contour Program for Domestic Satellite Earth Stations
PB-241 628/7CP

The Telecommunication/Data Management System (TCDMS) IBM Assembler Language Computer System Magnetic Tape, Release No. 2
PB-250 763/0CP

TV and FM Broadcasting Field Strength (TVFMFS) Computer Program
PB-251 129/3CP

RADIAT Computer Program
PB-260 426/2CP

Convert Ebcdic Photon Typesetter Drive Tapes to Tts Code.
PB-266 790/5CP

SPACE COMMUNICATION
Space/Terrestrial Radio Service Coordination Areas: Program WARC 71.A28 User's Manual
COM-74-10409/2CP

Calculations of Interference Potential Between Geostationary Satellite Networks: Program WARC 71.A29 User's Manual
COM-74-10752/5CP

Study of Potential Applications of Digital Techniques to the APOLLO Unified S-Band Communications System, Phase 2 Final Report
N71-21465/CP

Study and Development of a Mathematical Analysis for the Performance Assessment of Space Communication System Parameters Final Report
N71-28162/CP

A Model for Calculating Expected Performance of the APOLLO Unified S-Band (Usb) Communication System
N72-18159/CP

SPACE COMMUNICATION SYSTEMS
Analysis of a Pseudo-Noise Addressing System for Multiple Access Communication with Applications of Error-Correcting Codes.
AD-711 001/CP

SPACE MISSIONS
Shuttle User Analysis (Study 2.2):. Volume 3. Business Risk and Value of Operations in Space (Bravo). Part 4: Computer Programs and Data Look-Up.
N76-32226/2CP

SPACE SHUTTLES
Performance Analysis of Wideband Data and Television Channels.
N75-19481/1CP

Space Vehicle Onboard Command Encoder.
N76-18203/9CP

SPACECRAFT COMMUNICATION
Significant Accomplishments in Technology, Goddard Space Flight Center, 1970
N72-25755/CP

A Set of Satellite Link Calculation Programs
N73-33108/4CP

Performance Analysis of Wideband Data and Television Channels.
N75-19481/1CP

Data Collection Operational Support System, Part 1.
N76-22246/2CP

The Deep Space Network.
N77-21110/0CP

Link Analysis Program Linkan. Volume 1: Theoretical and Programmer'S Manual.
N78-31350/9CP

Link Analysis Program Linkan.
N78-31351/7CP

SPACECRAFT ELECTRONIC EQUIPMENT
Space Vehicle Onboard Command Encoder.
N76-18203/9CP

SPACECRAFT TRACKING
The Deep Space Network.
N77-21110/0CP

SPACECREWS
Astronaut/Computer Communication Study Final Report
N71-25922/CP

SPECTRAL ENERGY DISTRIBUTION
A Program Description of 'Orbit - Prints': Contours of Power Density at the Geostationary Orbit
PB-271 815/3CP

SPECTRUM ANALYSIS
Spectral Analysis Program. Volume 1: User'S Guide
N73-26145/5CP

SPECTRUM MANAGEMENT
Incorporation of Monitoring Data in the Frequency Assignment Process of the FCC Spectrum Management Task Force
PB-234 530/4CP

AFAM: Automatic Frequency Assignment Model
PB-243 555/0CP

National and Regional Spectrum Management Planning Assistance. Volume II
PB-243 680/6CP

SPEECH
Segmentation and Labeling of Speech: A Comparative Performance Evaluation
AD-A025 094/4CP

Research on Diagnostic Evaluation of Speech Intelligibility
AD-755 918/CP

Entropy Coded Adaptive Differential Pulse Code Modulation Systems for Speech Signals
AD-762 606/CP

Development of a Configuration Concept of a Speech Digitizer Based on Adaptive Estimation Techniques
AD-773 388/4CP

SPEECH ANALYSIS
Listener Preference and Comprehension Tests of Stress Algorithms for a Text-to-Phonetic Speech Synthesis Program
AD-A031 391/6CP

Analysis of Languages for Man-Machine Voice Communication
AD-A035 564/4CP

Speech Understanding Systems. Summary of Results of the Five-Year Research Effort at Carnegie-Mellon University
AD-A049 288/4CP

Phonemic Category Experiments
AD-A055 364/4CP

The Design and Testing of a System for Formant Tracking of Voiced Speech
PB-252 484/1CP

SPEECH COMPRESSION
Speech Signal Processing Research
AD-A020 489/1CP

Speech Signal Processing Research. Appendices 1 thru 9
AD-A022 589/6CP

SPEECH PROCESSING
Speech Signal Processing Research
AD-A020 489/1CP

Speech Signal Processing Research. Appendices 1 thru 9
AD-A022 589/6CP

Speech Understanding Systems. Volume I. Introduction and Overview
AD-A035 165/0CP

Speech Understanding Systems. Volume II. Acoustic Front End
AD-A035 166/8CP

Speech Understanding Systems. Volume III. Lexicon, Lexical Retrieval and Control
AD-A035 167/6CP

Speech Understanding Systems. Volume IV. Syntax and Semantics
AD-A035 277/3CP

Speech Understanding Systems. Volume V. Trip
AD-A035 278/1CP

The Development of a Computer Speech Processing System and Its Use for the Study and Development of Processing Methods for Enhancing the Intelligibility of Speech in Noise
AD-A047 240/7CP

SPEECH RECOGNITION
Two Programs for Speech Recognition and System Identification Research
AD-A003 806/7CP

A Speech Processing System
AD-A004 158/2CP

A Locally-Organized Parser for Spoken Input
AD-A006 310/7CP

Prosodic Aids to Speech Recognition: VI. Timing Cues to Linguistic Structure and Improved Computer Programs for Prosodic Analysis
AD-A010 221/0CP

Speech Digitization Excitation Study
AD-A012 740/7CP

The CASPERS Linguistic Analysis System
AD-A016 701/5CP

Speech Synthesis by a Programmable Digital Filter
AD-A019 842/4CP

Automatic Translation of English Text to Phonetics by Means of Letter-to-Sound Rules
AD-A021 929/5CP

Segmentation and Labeling of Speech: A Comparative Performance Evaluation
AD-A025 094/4CP

Parallelism in AI Problem Solving:. A Case Study of Hearsay II
AD-A025 159/5CP

Inverse Filter Parameters for Speaker Identification
AD-A026 847/4CP

Computer Identification of Phonemes in Continuous Speech
AD-A034 274/1CP

Speech Understanding Systems. Volume I. Introduction and Overview
AD-A035 165/0CP

Speech Understanding Systems. Volume II. Acoustic Front End
AD-A035 166/8CP

Speech Understanding Systems. Volume III. Lexicon, Lexical Retrieval and Control
AD-A035 167/6CP

Speech Understanding Systems. Volume IV. Syntax and Semantics
AD-A035 277/3CP

Speech Understanding Systems. Volume V. Trip
AD-A035 278/1CP

Analysis of Languages for Man-Machine Voice Communication
AD-A035 564/4CP

Voice Input Code Identifier (VICI)
AD-A040 994/6CP

Alpha/Numeric Extraction Technique Phase II
AD-A041 759/2CP

Voice Control Systems for Airborne Environments
AD-A043 252/6CP

Key Word Classification
AD-A044 605/4CP

Objective Measurement of Voice Channel Intelligibility
AD-A048 611/8CP

Speech Understanding Systems. Summary of Results of the Five-Year Research Effort at Carnegie-Mellon University
AD-A049 288/4CP

Early Data from a Real-Time Cochlea
AD-A049 520/0CP

An Algorithm for Determining Speech Intelligibility
AD-A055 236/4CP

LISTEN: A System for Recognizing Connected Speech Over Small, Fixed Vocabularies, In Real Time
AD-A056 231/4CP

Automatic Recognition of Synthetic Speech Using an Electronic Model of the Middle and Inner Ear
AD-A056 509/3CP

Phonemic Category Experiments
AD-B004 707/6CP

Voice Input Code Identifier
AD-B006 851/0CP

Advantages of Quick-Look Pattern Recognition in Air Force Signal Analysis.
AD-712 102/CP

Automatic Speech Level Meter
N73-31402/3CP

The Design and Testing of a System for Formant Tracking of Voiced Speech
PB-252 484/1CP

SPEECH THERAPY

The Design and Testing of a System for Formant Tracking of Voiced Speech
PB-252 484/1CP

SPEECH TRANSMISSION

Speech Signal Processing Research
AD-A020 489/1CP

Speech Signal Processing Research. Appendices 1 thru 9
AD-A022 589/6CP

Listener Preference and Comprehension Tests of Stress Algorithms for a Text-to-Phonetic Speech Synthesis Program
AD-A031 391/6CP

Codex Speech Digitizer Advanced Development Model
AD-A031 509/3CP

Adaptive Multilevel 16KB/S Speech Coder
AD-A031 516/8CP

The Development of a Computer Speech Processing System and Its Use for the Study and Development of Processing Methods for Enhancing the Intelligibility of Speech in Noise
AD-A047 240/7CP

SPLINE FUNCTIONS

Development of Smoothing Spline Functions for Telemetry Data. Volume 3: Programs and Numerical Results Etude du Developpement des Fonctions-Spline de Lissage pour des Donnees de Telemesure. Volume 3 (Programmes et Resultats Numeriques).
N77-21913/7CP

SPLINE INTERPOLATION

Development of Smoothing Spline Functions for Telemetry Data. Volume 3: Programs and Numerical Results Etude du Developpement des Fonctions-Spline de Lissage pour des Donnees de Telemesure. Volume 3 (Programmes et Resultats Numeriques).
N77-21913/7CP

SPREAD SPECTRUM TECHNIQUE

Study of Spread Spectrum and Convolutional Code Techniques. Volume 2: Software Descriptions.
N77-18319/2CP

STAMP COMPUTER PROGRAM

Preliminary Reference Manual for Program STAMP (STatistics of Acoustic Measurements and Predictions)
AD-A020 742/3CP

STATISTICAL ANALYSIS

Preliminary Reference Manual for Program STAMP (STatistics of Acoustic Measurements and Predictions)
AD-A020 742/3CP

STOCHASTIC PROCESSES

Data Analysis for Stochastic Processes
AD-A038 356/2CP

STORED CHANNEL SIMULATORS

HF Channel Simulation
AD-A027 429/0CP

STRESS (PHYSIOLOGY)

Voice Control Systems for Airborne Environments
AD-A043 252/6CP

STRUCTURED PROGRAMMING

Respecifying the Telegram Problem
AD-A040 615/7CP

SURFACE TO SURFACE MISSILES

MINUTEMAN FSD Communications Study Report
AD-A012 230/9CP

SWITCHING

Analysis and Design of Switching Components for a TDM Communication System
AD-781 185/4CP

SWITCHING THEORY

Program Documentation for the Digital Switching Experiment Program
AD-A030 363/6CP

SYNCHRONIZATION (ELECTRONICS)

TCP Resynchronization
AD-A024 822/9CP

Analysis of Jitter Characteristics in a Pulse Stuffing TDM Network
AD-A049 310/6CP

SYNTAX

An Experimental Implementation of a FORMAT D Message Analyser by Syntactic Specification
AD-A028 934/8CP

Speech Understanding Systems. Volume IV. Syntax and Semantics
AD-A035 277/3CP

SYSTEMS ANALYSIS

The ECSS II Language for Simulating Computer Systems
AD-A021 262/1CP

Development of Communications Analysis Techniques
N73-16125/CP

SYSTEMS ENGINEERING

The Deep Space Network, Volume 8
N72-22313/CP

Development of Communications Analysis Techniques
N73-16125/CP

Conversion Subsystems for the Electronic Mail Handling Program. Task II Report, A Digital Simulation Model
PB-235 201/1CP

TACTICAL COMMUNICATIONS

Cost Effectiveness Program Plan for Joint Tactical Communications. Volume III. Life Cycle Costing. Appendix F. Computer Models for LCC
AD-A027 643/6CP

COMMEL II User's Manual. Volume I. Model Overview
AD-A031 613/3CP

COMMEL II User's Manual. Volume II. Input Data Preparation
AD-A031 614/1CP

COMMEL II User's Manual. Volume III. Appendixes
AD-A031 615/8CP

AN/TSQ-84 Upgraded Components
AD-A042 467/1CP

Cost Effectiveness Program Plan for Joint Tactical Communications. Volume III. Life Cycle Costing. Appendix F. Computer Models for LCC
AD-A056 981/4CP

Tactical Routing Indicator Look-Up and Header Preparation Device (TACRAHD)
AD-771 958/6CP

Communications Support Requirements (COMSR) Study. Volume 8, Appendix C
AD-778 237/8CP

TACTICAL DATA SYSTEMS

A Preliminary Cost Analysis of the Communications Processor for the F-15 Joint Tactical Information Distribution System
AD-A027 365/6CP

Application of Tactical Data System Computer-Programming Specification to TAOC
AD-A055 167/1CP

TCP (TRANSMISSION CONTROL PROGRAM)

ARPA Internetwork Protocols Project Status Report
AD-A024 819/5CP

Single-Connection TCP Specification (Preliminary Documentation)
AD-A024 820/3CP

TELNET under Single-Connection TCP Specification
AD-A024 821/1CP

TCP Resynchronization
AD-A024 822/9CP

ARPA Internetwork Protocols Project Status Report
AD-A024 823/7CP

TDR SATELLITES

Technology Forecasting for Space Communication. Task One Report: Cost and Weight Tradeoff Studies for Eos and Tdrs.
N76-16129/8CP

TECHNOLOGY ASSESSMENT

Significant Accomplishments in Technology, Goddard Space Flight Center, 1970
N72-25755/CP

TELECOMMUNICATION

Advance Identification of Catastrophic Traffic Build-Up in the Naval Telecommunication Command
AD-A015 960/8CP

Avoidance of Collateral Blast Damage to Increase Survivability of Military Telecommunications Networks
AD-A030 462/6CP

System Integration and Interface Transition Issues
AD-A041 457/3CP

Framework and Functions of the 'MS' Personal Message System
AD-A048 774/4CP

Antenna Selection for Ionospheric Telecommunication Systems
AD-A049 549/9CP

Calculations of Interference Potential Between Geostationary Satellite Networks: Program WARC 71.A29 User's Manual
COM-74-10752/5CP

Multicommodity Network Plotting via Program NETPLT
COM-74-50634/6CP

Information Transfer Satellite Concept Study. Volume 4 Computer Manual
N72-18864/CP

Advanced Communication System Time Domain Modeling Techniques Asystd Software Description. Volume 1 Program Users Guide
N72-30148/CP

Advanced Communication System Time Domain Modeling Techniques Asystd Software Description. Volume 2 Program Support Documentation
N72-30149/CP

State Criminal Justice Telecommunications (Stacom). Volume 4: Network Design Software User'S Guide.
N78-16221/1CP

Teleprocessing Systems Study. Volume I
PB-220 657/1CP

Teleprocessing Systems Study. Volume II. User Instruction Manual
PB-220 658/9CP

Teleprocessing Systems Study. Volume III. Program Listings and Documentation
PB-220 659/7CP

Teleprocessing Systems Study. Description of the Model
PB-220 660/5CP

The Domestic Telecommunications Industry: Economic Behavior, Competition, and Public Policy. Appendices
PB-238 019/4CP

Research and Development Contract for Coal Mine Communication System. Volume 3. Theoretical Data Base
PB-244 899/1CP

The Telecommunication/Data Management System (TCDMS) IBM Assembler Language Computer System Magnetic Tape, Release No. 2
PB-250 763/0CP

TCDMS Utilities Manual (Data Management Section)
PB-250 992/5CP

Power and Beam Pointing Restrictions for Geostationary Orbit Avoidance: Program ORBITCHECK User's Manual
PB-268 027/0CP

Evaluation of Experimental and Developmental Communication Systems Used in Underground Coal Mines. Performance of Trapped-Miner Communication System
PB-274 683/2CP

TELEGRAMS

Respecifying the Telegram Problem
AD-A040 615/7CP

TELEGRAPH SYSTEMS

A Computer Program for the Simulation of Store and Forward Telegraph Networks
AD-A011 083/3CP

An Experimental Implementation of a FORMAT D Message Analyser by Syntactic Specification
AD-A028 934/8CP

Respecifying the Telegram Problem
AD-A040 615/7CP

A Computer Program for the Simulation of Store and Forward Telegraph Networks.
N75-33297/3CP

TELEMETRY

Simulation Studies for NOAA Stabilized Compensation Program
COM-74-10517/2CP

Formulation of a Telemetry Computer Program Final Report.
N70-32456/CP

Development of Smoothing Spline Functions for Telemetry Data. Volume 3: Programs and Numerical Results Etude du Developpement des Fonctions-Spline de Lissage pour des Donnees de Telemesure. Volume 3 (Programmes et Resultats Numeriques).
N77-21913/7CP

TELEPHONE COMMUNICATION SYSTEMS

A Multi-Commodity Concave Cost Minimization Problem for Communication Networks
AD-740 119/CP

Interference Mitigation Studies for Texas Telephone and Power Distribution Systems
AD-768 072/1CP

Wireline Simulator
AD-866 966/CP

TELEPHONE SYSTEMS

A Study of Naval Administrative Telephone System Management
AD-A009 903/6CP

Executive Summary: New York City Pilots Automatic Telephone Weather Answering Service (PATWAS) Test
AD-A046 755/5CP

Offered Traffic Calculations
AD-A052 365/4CP

SUBJECT INDEX

Autodin Time Sharing Editor System Program Reports
AD-917 041/6CP

Autodin Time Sharing Editor System Users Manual
AD-917 047/3CP

A Demand Assignment Multiple Access (DAMA) Control System for Thin-Route Satellite Telephone Systems
PB-286 162/3CP

TELETYPE SYSTEMS

A Model for Teletype Communications Evaluation
AD-744 467/CP

Fleet Multi-Channel Broadcast Traffic Intensity Study
AD-755 760/CP

TELETYPEWRITER SYSTEMS

The Genrel Teletype Package
N72-26118/CP

TELEVISION BROADCASTING

(UCAP) - UHF-TV Channel Assignment Program
PB-241 307/8CP

Field Strength Calculation for TV and FM Broadcasting (Computer Program TVFMFS)
PB-249 144/7CP

TV and FM Broadcasting Field Strength (TVFMFS) Computer Program
PB-251 129/3CP

TELEVISION BROADCASTINGS

VHF-TV, Computer Assignment Program (VCAP)
PB-236 272/1CP

TELEVISION DISPLAY SYSTEMS

Raster Graphics Image Transformer
AD-A017 483/9CP

TELEVISION SYSTEMS

Simulation Code for Underwater Television Systems (SCOUTS)
AD-A048 769/4CP

Television Broadcast Satellite Systems, Volume 1
N72-31176/CP

Computer-Aided Design in Television Circuits.
N74-31620/9CP

TELEVISION TRANSMISSION

Frequency Modulation Television Analysis: Threshold Impulse Analysis
N74-16885/7CP

Performance Analysis of Wideband Data and Television Channels.
N75-19481/1CP

A Study of Interference in Satellite Broadcasting.
N78-17281/4CP

TENEX COMPUTER PROGRAM

Distributed Computation and TENEX-Related Activities
AD-A025 956/4CP

TENEX SYSTEM

TENEX MSG User Manual
AD-A039 599/6CP

TEST EQUIPMENT

Economic Analysis of Selected Test Measurement and Diagnostic Equipment from the U.S. Army Communications Command Preferred Items List. Volume 2. Technical Report
AD-A052 161/7CP

TEST EQUIPMENT (ELECTRONICS)

Scate Mark V, Feasibility Demonstration.
AD-709 638/CP

TIME DIVISION MULTIPLE ACCESS

Unique Words for Identification and Synchronization in TDMA Satellite Communications Systems
AD-784 762/7CP

TIME DIVISION MULTIPLEXING

The 'Standard' MUX Bus: Some Constraints on Information Flow Arising from MIL-STD-1553 (USAF)
AD-A017 677/6CP

Supplemental Conceptual Design Study of an Integrated Voice/Data Switching and Multiplexing Technique for an Access Area Exchange
AD-A034 132/1CP

Analysis of Jitter Characteristics in a Pulse Stuffing TDM Network
AD-A049 310/6CP

Analysis and Design of Switching Components for a TDM Communication System
AD-781 185/4CP

TIME SERIES ANALYSIS

Signal Analysis and Parametrization for EMP Data
AD-A020 493/3CP

Generation of a Stationary Gaussian Random Process with a Specified Power Spectral Density Function
AD-A031 725/5CP

TIME SHARING

The Genrel Teletype Package
N72-26118/CP

TIME VARYING CHANNELS

HF Channel Simulation
AD-A027 429/0CP

TORUS ANTENNAS

Multiple Beam Torus Antenna Study. Volume II
AD-A047 158/1CP

TRADEOFFS

Technology Forecasting for Space Communication. Task One Report: Cost and Weight Tradeoff Studies for Eos and Tdrs.
N76-16129/8CP

TRANSDUCERS

The Performance of 31 and 127 Bit Elastic Surface Wave Encoders and Decoders
AD-762 910/CP

TRANSIONOSPHERIC PROPAGATION

Modeling of Transionospheric Radio Propagation
AD-A023 197/7CP

TRANSMISSION CONTROL PROGRAM

ARPA Internetwork Protocols Project Status Report
AD-A024 819/5CP

Single-Connection TCP Specification (Preliminary Documentation)
AD-A024 820/3CP

TELNET under Single-Connection TCP Specification
AD-A024 821/1CP

TCP Resynchronization
AD-A024 822/9CP

ARPA Internetwork Protocols Project Status Report
AD-A024 823/7CP

TRANSMISSION LINES

Interference Mitigation Studies for Texas Telephone and Power Distribution Systems
AD-768 072/1CP

Link Analysis Program Linkan. Volume 1: Theoretical and Programmer'S Manual.
N78-31350/9CP

Link Analysis Program Linkan.
N78-31351/7CP

MERTL (Multidrop Efficiency Regarding Transmission Lines)
PB-271 320/4CP

TRANSMITTER RECEIVERS

The Development of a Multiturn Loop Antenna for the AN/PRC-77
AD-A006 929/4CP

Algorithms for Transceiver Modulation and Demodulation
AD-744 082/CP

TRANSPONDERS

Development of a Discrete Address Beacon System
AD-A046 580/7CP

TRAVEL

Wilderness Area Simulation Model - User's Manual
PB-233 364/9CP

Wilderness Area Simulation Model
PB-233 488/6CP

TROPOSPHERIC SCATTER COMMUNICATIONS

Parameter Selection for the Muntner-Wolf Model
AD-A019 825/9CP

Analysis of Wideband Scope Creek Report Data Using Computer Techniques
AD-A038 531/0CP

DEMOD/Decoder Integration
AD-A053 685/4CP

Phased Array Antenna Amplifier Exploratory Development Model (100 watts)
AD-A056 173/8CP

TYPESETTING

A Contribution to Computer Typesetting Techniques: Tables of Coordinates for Hershey's Repertory of Occidental Type Fonts and Graphic Symbols
PB-251 845/4CP

Computer Science and Technology: FORTRAN IV Enhanced Character Graphics
PB-279 939/3CP

TYPOGRAPHY

Computer Science and Technology: FORTRAN IV Enhanced Character Graphics
PB-279 939/3CP

UNDERWATER EQUIPMENT

Simulation Code for Underwater Television Systems (SCOUTS)
AD-A048 769/4CP

UNDERWATER SOUND

Investigation of the Propagation Stability of a Time Spread Underwater Acoustic Channel
AD-778 683/3CP

UNIFIED S BAND

A Model for Calculating Expected Performance of the APOLLO Unified S-Band (Usb) Communication System
N72-18159/CP

UNITED STATES GOVERNMENT

Study of Electronic Handling of Mail. Completion Report for Work Task 5. Transmission Methods.
AD-715 121/CP

USER MANUALS (COMPUTER PROGRAMS)

Shuttle User Analysis (Study 2.2): Volume 3. Business Risk and Value of Operations in Space (Bravo). Part 4: Computer Programs and Data Look-Up.
N76-32226/2CP

State Criminal Justice Telecommunications (Stacom). Volume 4: Network Design Software User'S Guide.
N78-16221/1CP

Link Analysis Program Linkan.
N78-31351/7CP

VERY LOW FREQUENCIES

Vlf Receiver Calibration.
N74-19103/2CP

VIDEO FILTERS

Inverse Filter Parameters for Speaker Identification
AD-A026 847/4CP

VIDEO PROCESSING

A Digitizing System for 525 Line, 60 Hz, Monochrome Television
AD-A027 298/9CP

VIDEO TAPE RECORDING

A Digitizing System for 525 Line, 60 Hz, Monochrome Television
AD-A027 298/9CP

VIKING LANDER SPACECRAFT

The Deep Space Network, Volume 4 Progress Report, May - Jun. 1971
N71-33163/CP

VOCODERS

Codex Speech Digitizer Advanced Development Model
AD-A031 509/3CP

Adaptive Multilevel 16KB/S Speech Coder
AD-A031 516/8CP

Early Data from a Real-Time Cochlea
AD-A049 520/0CP

Single-Channel Voice-Response-System Program Documentation. Volume I. System Description
AD-A051 543/7CP

A Simulation of A Complex Microelectronic Module Containing Analogue and Digital Elements
AD-761 206/CP

VOICE COMMUNICATION SYSTEMS

Research on Diagnostic Evaluation of Speech Intelligibility
AD-755 918/CP

Power Spectra of Computer Simulated Frequency Modulation with Digital Minimum Shift Keying and Voice Input
AD-763 592/CP

VOICE COMMUNICATIONS

A Speech Processing System
AD-A004 158/2CP

Minimal Rate Digital Voice Transmission
AD-A004 975/9CP

Simulation Model for New York Air Traffic Control Communications
AD-A006 426/1CP

Program Documentation for the Digital Switching Experiment Program
AD-A030 363/6CP

Codex Speech Digitizer Advanced Development Model
AD-A031 509/3CP

Adaptive Multilevel 16KB/S Speech Coder
AD-A031 516/8CP

Supplemental Conceptual Design Study of an Integrated Voice/Data Switching and Multiplexing Technique for an Access Area Exchange
AD-A034 132/1CP

Integrated DoD Voice and Data Networks and Ground Packet Radio Technology Volume 1. Integrated DoD Voice and Data Networks. Part 1
AD-A039 329/8CP

Integrated DoD Voice and Data Networks and Ground Packet Radio Technology. Volume 1. Integrated DoD Voice and Data Networks. Part 2
AD-A039 330/6CP

Integrated DoD Voice and Data Networks and Ground Packet Radio Technology Volume 2. Cost Trends for Large Volume Packet Networks
AD-A039 331/4CP

Integrated DoD Voice and Data Networks and Ground Packet Radio Technology Volume 3. Topological Gateway Placement Strategies
AD-A039 332/2CP

Integrated DoD Voice and Data Networks and Ground Packet Radio Technology Volume 4. Ground Packet Radio Technology
AD-A039 333/0CP

Air Traffic Control Experimentation and Evaluation with the NASA ATS-6 Satellite. Volume II. Demonstration of Satellite-Supported Communications and Surveillance for Oceanic Air Traffic Control
AD-A042 146/1CP

Objective Measurement of Voice Channel Intelligibility
AD-A048 611/8CP

Busy Hour Model Program Reports
AD-917 036/6CP

Busy Hour Model User's Manual
AD-917 046/5CP

VOICEPRINTS

Voice Control Systems for Airborne Environments
AD-A043 252/6CP

VOLTAGE CONTROLLED OSCILLATORS

Research in Integrated, High-Frequency Communication Circuits
AD-A043 560/2CP

W CODES

Noise Immunity in Digital Communication by Use of Orthogonal Signal Correlation and Walsh Functions.
LA-5896

WALSH FUNCTIONS

3-to-1 Data Compression Via Walsh Transform
AD-774 082/2CP

WALSH TRANSFORMATION

3-to-1 Data Compression Via Walsh Transform
AD-774 082/2CP

WAVEFORMS

Method of Optimization of a Periodic Step Waveform for Minimization of Total Harmonic Distortion
AD-A020 156/6CP

WEATHER COMMUNICATIONS

Executive Summary: New York City Pilots Automatic Telephone Weather Answering Service (PATWAS) Test
AD-A046 755/5CP

WEIGHT ANALYSIS

Technology Forecasting for Space Communication. Task One Report: Cost and Weight Tradeoff Studies for Eos and Tdrs.
N76-16129/8CP

WIDEBAND COMMUNICATION

Performance Analysis of Wideband Data and Television Channels.
N75-19481/1CP

WILDERNESS AREAS

Wilderness Area Simulation Model - User's Manual
PB-233 364/9CP

Wilderness Area Simulation Model
PB-233 488/6CP

WIRELINE SIMULATORS

Wireline Simulator
AD-866 966/CP

WORD RECOGNITION

Voice Input Code Identifier (VICI)
AD-A040 994/6CP

Alpha/Numeric Extraction Technique Phase II
AD-A041 759/2CP

Key Word Classification
AD-A044 605/4CP

Phonemic Category Experiments
AD-A055 364/4CP

Voice Input Code Identifier
AD-B006 851/0CP

Unique Words for Identification and Synchronization in TDMA Satellite Communications Systems
AD-784 762/7CP

CORPORATE AUTHOR INDEX

ADCOM, CAMBRIDGE, MASS.

G-118-FTR
Wireline Simulator
(RADC-TR-69-107)
AD-866 966/CP

ADVANCED RESEARCH RESOURCES ORGANIZATION, SILVER SPRING, MD.

Implementation of User Demand and Satisfaction Model for Personal Radio Services
(FCC/DF-78/002a)
PB-276 611/1CP

AERONAUTICAL SYSTEMS DIV WRIGHT-PATTERSON AFB OHIO

ASD-TR-78-17
B-1 EMUX Automated Logic Diagrammer Demonstration Program
AD-A056 964/0CP

AERONUTRONIC FORD CORP PALO ALTO CALIF WESTERN DEVELOPMENT LABS DIV

WDL-TR-5851
Raster Graphics Image Transformer
(RADC-TR-75-172)
AD-A017 483/9CP

AEROSPACE CORP., EL SEGUNDO, CALIF.

ATR-74(7342)-1-V-3-PT-4
Shuttle User Analysis (Study 2.2): Volume 3. Business Risk and Value of Operations in Space (Bravo). Part 4: Computer Programs and Data Look-Up.
N76-32226/2CP

NASA-CR-148750
Shuttle User Analysis (Study 2.2): Volume 3. Business Risk and Value of Operations in Space (Bravo). Part 4: Computer Programs and Data Look-Up.
N76-32226/2CP

AIR FORCE AVIONICS LAB WRIGHT-PATTERSON AFB OHIO

AFAL-TR-77-228
Rooftop Antenna Pointing Program
AD-A047 999/8CP

AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD MASS

AFCRL-PSRP-521
The Performance of 31 and 127 Bit Elastic Surface Wave Encoders and Decoders
AD-762 910/CP

AFCRL-TR-73-0736
The Performance of 31 and 127 Bit Elastic Surface Wave Encoders and Decoders
AD-762 910/CP

AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL OF ENGINEERING

AFIT/DS/EE/78-3
Automatic Recognition of Synthetic Speech Using an Electronic Model of the Middle and Inner Ear
AD-A056 509/3CP

AFIT/GCS/EE/77-3
A General Computer Network Simulation Model
AD-A039 772/9CP

AFIT/GE/EE/76D-39
Analysis of Wideband Scope Creek Report Data Using Computer Techniques
AD-A038 531/0CP

AFIT/GE/EE/77-3
Modification of the AN/TGC-26 Multiple Address Processing Unit to Accept JANAP 128 Format
AD-A039 720/8CP

AFIT/GE/EE/77-9
An Algorithm for Determining Speech Intelligibility
AD-A055 236/4CP

AFIT/GE/EE/77S-6
Structured Analysis and Design of a Satellite Simulator
AD-A055 192/9CP

GE/EE/73A-10
Energy Spectra for Frequency-Shift-Keyed Signals Transmitted by Synchronously Resonated, Very Low Frequency Antennas
AD-777 268/4CP

GE/EE/75-41
Speech Synthesis by a Programmable Digital Filter
AD-A019 842/4CP

GE/EE/76-24
Computer Identification of Phonemes in Continuous Speech
AD-A034 274/1CP

GSM/SM/76S-8
A Preliminary Cost Analysis of the Communications Processor for the F-15 Joint Tactical Information Distribution System
AD-A027 365/6CP

AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL OF SYSTEMS AND LOGISTICS

SLSR-8-74A
A Computer Simulation of a Base Telecommunication Center
AD-776 783/3CP

AIR FORCE WEAPONS LAB KIRTLAND AFB N MEX

AFWL-TR-76-3
A Digitizing System for 525 Line, 60 Hz, Monochrome Television
AD-A027 298/9CP

AFWL-TR-76-193
Data Analysis for Stochastic Processes
AD-A038 356/2CP

ALABAMA UNIV., UNIVERSITY. BUREAU OF ENGINEERING RESEARCH.

BER-130-70-VOL-2
Study of Atmospheric Effects on Laser Communications Systems. Volume 2 - Atmospheric Effects on Wave Propagation at 10.6 Microns Interim Report
N71-26419/CP

NASA-CR-103113
Study of Atmospheric Effects on Laser Communications Systems. Volume 2 - Atmospheric Effects on Wave Propagation at 10.6 Microns Interim Report
N71-26419/CP

ALASKA UNIV COLLEGE GEOPHYSICAL INST

TR-2
Project SECEDE. Tracking Barium releases using the TV-TRACK System
(RADC-TR-71-195)
AD-731 574/CP

APPLIED PHYSICS LAB., JOHNS HOPKINS UNIV., LAUREL, MD. SPACE DEPT.

APL/JHU-S1R78U-009
Prediction of Attenuation of the 28 Ghz Comstar Beacon Signal Using Radar and Measured Rain Drop Spectra.
N78-30483/9CP

NASA-CR-156810
Prediction of Attenuation of the 28 Ghz Comstar Beacon Signal Using Radar and Measured Rain Drop Spectra.
N78-30483/9CP

APPLIED PSYCHOLOGICAL SERVICES INC WAYNE PA

A Digital Simulation Model of Message Handling in the Tactical Operations System. III. Further Extensions of the Model for Increased Interaction
(ARI-TR-77-A25)
AD-A047 105/2CP

APPLIED PSYCHOLOGICAL SERVICES INC WAYNE PA SCIENCE CENTER

A Computer Model for Simulation of Message Processing in Military Exercise Control and Evaluation Systems
(ARI-TR-77-A22)
AD-A045 832/3CP

ARINC RESEARCH CORP ANNAPOLIS MD

555-01-4-812
Application of Tactical Data System Computer-Programming Specification to TAOC
AD-A055 167/1CP

1072-02-3-1403
Economic Analysis of Selected Test Measurement and Diagnostic Equipment from the U.S. Army Communications Command Preferred Items List. Volume 2. Technical Report
AD-A052 161/7CP

ARINC RESEARCH CORP SANTA ANA CALIF

4826-851
A Computerized Command and Control System for the Los Angeles City Fire Department
AD-A054 750/5CP

ARMY COMMUNICATIONS-ELECTRONICS ENGINEERING INSTALLATION AGENCY FORT HUACHUCA ARIZ PROPAGATION ENGINEERING DIV

EMEO-PED-TM-77-1
Antenna Selection for Ionospheric Telecommunication Systems
AD-A049 549/9CP

ARMY ELECTRONICS COMMAND FORT MONMOUTH N J

ECOM-4212
FOREST - A Computer Program to Compute Radio Loss Between Two Antennas Embedded in a Forest Environment
AD-777 501/8CP

ECOM-4264
Convolutional Decoder Performance on VHF and Troposcatter Channels
AD-A000 670/0CP

ECOM-4338
Life Cycle Cost Model
AD-A013 369/4CP

ARMY ENGINEER WATERWAYS EXPERIMENT STATION VICKSBURG MISS

WES-MP-K-76-4
NETDEN: An Interactive Network Design Graphics Simulation
AD-A029 225/0CP

ARMY MATERIEL SYSTEMS ANALYSIS AGENCY ABERDEEN PROVING GROUND MD

AMSAA-TM-135
A Model for Teletype Communications Evaluation
AD-744 467/CP

ARMY MILITARY PERSONNEL CENTER ALEXANDRIA VA

X-SIM. A Dynamic Communications Simulator for the X-Tree Network Report and User's Manual
AD-A055 945/0CP

ARMY MOBILITY EQUIPMENT RESEARCH AND DEVELOPMENT CENTER FORT BELVOIR VA

USAMERDC-2148
Method of Optimization of a Periodic Step Waveform for Minimization of Total Harmonic Distortion
AD-A020 156/6CP

ATLANTIC RESEARCH CORP., ALEXANDRIA, VA. JANSKY AND BAILEY ENGINEERING DEPT.

Prediction Routine Studies. Volume I. Sample Problems and Frequency Band Analysis
(RADC-TR-68-345-Vol-1)
AD-846 957/CP

Prediction Routine Studies. Volume II. Intermodulation Analysis
(RADC-TR-68-345-Vol-2)
AD-846 961/CP

Prediction Route Studies. Volume III. Field Strength/Power Density Program
(RADC-TR-68-345-Vol-3)
AD-846 962/CP

ATLANTIC RESEARCH CORP., ALEXANDRIA, VA. JANSKY AND BAILEY RESEARCH AND ENGINEERING DEPT.

Adjacent Channel Interference Analysis
(RADC-TR-68-595)
AD-850 385/CP

AUBURN UNIV., ALA. ENGINEERING EXPERIMENT STATION.

NASA-CR-123818
Television Broadcast Satellite Systems, Volume 1
N72-31176/CP

AUSTRALIAN POST OFFICE RESEARCH LABS., MELBOURNE.

REPT-6648
Automatic Speech Level Meter
N73-31402/3CP

REPT-6806
A Set of Satellite Link Calculation Programs
N73-33108/4CP

BELL AEROSYSTEMS CO., TUCSON, ARIZ. ARIZONA OPERATIONS.

LF/VLF Propagation Analysis Computer Program Documentation
(RADC-TR-68-453)
AD-846 735/CP

BELLCOMM, INC., WASHINGTON, D.C.

NASA-CR-125670
A Model for Calculating Expected Performance of the APOLLO Unified S-Band (Usb) Communication System
N72-18159/CP

TM-71-2034-3
A Model for Calculating Expected Performance of the APOLLO Unified S-Band (Usb) Communication System
N72-18159/CP

BOLT BERANEK AND NEWMAN INC CAMBRIDGE MASS

BBN-3210
Distributed Computation and TENEX-Related Activities
AD-A018 660/1CP

BBN-3236
Interface Message Processors for the ARPA Computer Network
AD-A020 480/0CP

BBN-3257
Distributed Computation and TENEX-Related Activities
AD-A022 380/0CP

BBN-3315
Distributed Computation and TENEX-Related Activities
AD-A025 956/4CP

BBN-3438-Vol-1
Speech Understanding Systems. Volume I. Introduction and Overview
AD-A035 165/0CP

BBN-3438-Vol-2
Speech Understanding Systems. Volume II. Acoustic Front End
AD-A035 166/8CP

BBN-3438-Vol-3
Speech Understanding Systems. Volume III. Lexicon, Lexical Retrieval and Control
AD-A035 167/6CP

BBN-3438-Vol-4
Speech Understanding Systems. Volume IV. Syntax and Semantics
AD-A035 277/3CP

BBN-3438-Vol-5
Speech Understanding Systems. Volume V. Trip
AD-A035 278/1CP

BBN-3533
Communications Oriented Language (COL): Language Implementation and Usage
(SBIE-AD-E100006)
AD-A047 393/4CP

BBN-3534
Communications Oriented Language (COL): Language Definition
(SBIE-AD-E100007)
AD-A047 392/6CP

BBN-3540
TENEX MSG User Manual
AD-A039 599/6CP

BBN-3824-VOL-1
Combined Quarterly Technical Report No. 9. Volume 1. Packet Broadcast by Satellite PLURIBUS Satellite IMP Development UNIX System Development
AD-A055 438/6CP

BBN-3824-VOL-2
Combined Quarterly Technical Report Number 9. Volume 2. Private Line Interface Development Packet Network Security
AD-A055 439/4CP

Technical Information-89
The Interface Message Processor Program
AD-A025 358/3CP

Technical Information-89
The Interface Message Processor Program
AD-A040 675/1CP

Technical Information-90
The ARPANET Network Control Center Program
AD-A033 351/8CP

Technical Information-90
The Network Control Center Program
AD-786 134/7CP

Technical information-91
The Terminal Interface Message Processor Program
AD-A031 617/4CP

Technical Information-91
The Terminal Interface Message Processor Program
AD-A038 344/8CP

Technical Information-91
The Terminal Interface Message Processor Program
AD-786 135/4CP

CALIFORNIA STATE UNIV SAN JOSE DEPT OF SPEECH-COMMUNICATION

TR-3
Proximity: Location, Time, and Opportunity to Communicate
AD-A011 151/8CP

TR-5
PROXVAL Program Description
AD-A022 141/6CP

CALIFORNIA UNIV BERKELEY DEPT OF ELECTRICAL ENGINEERING AND COMPUTER SCIENCES

Research in Integrated, High-Frequency Communication Circuits
(ARO-12131.6-EL)
AD-A043 560/2CP

CALIFORNIA UNIV BERKELEY OPERATIONS RESEARCH CENTER

ORC-72-5
A Multi-Commodity Concave Cost Minimization Problem for Communication Networks
AD-740 119/CP

CALIFORNIA UNIV., LIVERMORE. LAWRENCE LIVERMORE LAB.

AMPS Automated Message Processing System, LER 76-101701A
UCID-17375

Computer Analysis of the Twin-Whip Antenna
UCRL-52080

CALIFORNIA UNIV LOS ANGELES CAMPUS COMPUTING NETWORK

CCN/TR12
An Implementation of the MSG Interprocess Communication Protocol
AD-A041 630/5CP

CALIFORNIA UNIV LOS ANGELES DEPT OF COMPUTER SCIENCE

UCLA-ENG-7453
A Speech Processing System
(AFOSR-TR-75-0069)
AD-A004 158/2CP

UCLA-ENG-7696
Computer Network Research
AD-A031 242/1CP

CALIFORNIA UNIV LOS ANGELES SCHOOL OF ENGINEERING AND APPLIED SCIENCE

UCLA-ENG-7252
Adaptive Routing Techniques for Message Switching Computer-Communication Networks
AD-749 678/CP

CALIFORNIA UNIV SANTA CRUZ

77-2-001
Respecifying the Telegram Problem
AD-A040 615/7CP

CARNEGIE-MELLON UNIV PITTSBURGH PA DEPT OF COMPUTER SCIENCE

Segmentation and Labeling of Speech: A Comparative Performance Evaluation
(AFOSR-TR-76-0604)
AD-A025 094/4CP

Parallelism in AI Problem Solving: A Case Study of Hearsay II
(AFOSR-TR-76-0598)
AD-A025 159/5CP

Analysis of Languages for Man-Machine Voice Communication
(AFOSR-TR-77-0055)
AD-A035 564/4CP

Speech Understanding Systems. Summary of Results of the Five-Year Research Effort at Carnegie-Mellon University
(AFOSR-TR-78-0002)
AD-A049 288/4CP

CHARLES STARK DRAPER LAB INC CAMBRIDGE MASS

T-644
Development of a Hierarchical, Dynamically Reconfigurable Input/Output Network
AD-A041 186/8CP

CLARKSON COLL OF TECHNOLOGY POTSDAM N Y

Analysis and Design of Switching Components for a TDM Communication System
(RADC-TR-74-32)
AD-781 185/4CP

CNR INC NEEDHAM MA

DEMOD/Decoder Integration
(RADC-TR-78-70)
AD-A053 685/4CP

CNR INC NEWTON MASS

CNR-14
HF Channel Simulation
AD-A027 429/0CP

CODEX CORP NEWTON MASS

Codex Speech Digitizer Advanced Development Model
AD-A031 509/3CP

COMITATO NAZIONALE PER L'ENERGIA NUCLEARE, ROME (ITALY).

Code for the Detection of Errors for Transmission of Ten-Bit Words.
RT/EL-(74)-6

COMMUNICATIONS RESEARCH CENTRE, OTTAWA (ONTARIO).

CRC-1313
Ionospheric Effects on the Doppler Frequency Shift in Sarsat Propagation.
N78-21334/5CP

COMPUTER SCIENCES CORP., FALLS CHURCH, VA.

CAC-R4195910-2-1
Busy Hour Model Program Reports
AD-917 036/6CP

CSC-R4195960-1-1
Autodin Time Sharing Editor System Users Manual
AD-917 047/3CP

CSC-R4195960-2-1
Autodin Time Sharing Editor System Program Reports
AD-917 041/6CP

CSC-3314-00000
Digital Controller Communication Link
(AFAL-TR-76-31)
AD-A028 245/9CP

NASA-CR-122340
Satellite Broadcasting System Study
N72-17111/CP

NASA-CR-132906
Frequency Modulation Television Analysis: Threshold Impulse Analysis
N74-16885/7CP

R417602-1-1
Development of New Techniques for Cost-Effective Network Designs
AD-913 995/7CP

R4195910-1-1
Busy Hour Model User's Manual
AD-917 046/5CP

REPT-3007-1
Frequency Modulation Television Analysis: Threshold Impulse Analysis
N74-16885/7CP

REPT-4124-011
Satellite Broadcasting System Study
N72-17111/CP

NSW GCOS Connection
(RADC-TR-76-228)
AD-A030 508/6CP

Design Plan for GCOS/ARPANET Interface
(RADC-TR-77-87)
AD-A038 433/9CP

Communications Support Requirements (COMSR) Study. Volume 8, Appendix C
AD-778 237/8CP

COMPUTER SCIENCES CORP SAN DIEGO CALIF

Simulation Code for Underwater Television Systems (SCOUTS)
(NOSC-TR-146)
AD-A048 769/4CP

COMSAT LABS CLARKSBURG MD

Multiple Beam Torus Antenna Study. Volume II
(SBIE-AD-E100-001)
AD-A047 158/1CP

CONTROL DATA CORP OTTAWA (ONTARIO) OTTAWA OPERATIONS

CDC-R583/110/PR
Tactical Routing Indicator Look-Up and Header Preparation Device (TACRAHD)
(ECOM-0189-F)
AD-771 958/6CP

CULLER/HARRISON INC GOLETA CALIF

CHI-FIN-101
Speech Signal Processing Research
AD-A020 489/1CP

Speech Signal Processing Research. Appendices 1 thru 9
AD-A022 589/6CP

CYBERNETIC RESEARCH AND DEVELOPMENT CORP PRINCETON N J

Advantages of Quick-Look Pattern Recognition in Air Force Signal Analysis.
(AFOSR-70-2409TR)
AD-712 102/CP

DECISIONS AND DESIGNS INC MCLEAN VA

DT/TR-75-2
Single Channel Ground and Airborne Radio Systems (SINCGARS) Evaluation Model
AD-A019 550/3CP

PR-77-4-6
Decision Analysis as an Element in an Operational Decision Aiding System (Phase IV)
AD-A045 083/3CP

DEFENCE RESEARCH ESTABLISHMENT PACIFIC VICTORIA (BRITISH COLUMBIA)

DREP-TM-77-11
The Effect of an Interfering Signal on the Performance of Nonparametric Detectors Using Spectral Estimates
AD-A052 350/6CP

DEFENSE COMMUNICATIONS AGENCY SYSTEM ENGINEERING FACILITY RESTON VA

DCASEF-TN-2-72
Store-and-Forward Network Performance Model (MODI)
AD-A014 542/5CP

DEFENSE COMMUNICATIONS ENGINEERING CENTER RESTON VA

TN-22-76
Avoidance of Collateral Blast Damage to Increase Survivability of Military Telecommunications Networks
AD-A030 462/6CP

TN-41-75
A Unified Approach to Modelling Loop Service Systems: A Preliminary Report
AD-A021 940/2CP

TR-2-77
System Integration and Interface Transition Issues
AD-A041 457/3CP

DIALOG SYSTEMS INC CAMBRIDGE MA

Key Word Classification
(RADC-TR-77-122)
AD-A044 605/4CP

DUKE UNIV DURHAM N C ADAPTIVE SIGNAL DETECTION LAB

TR-12
Relationships Between Detection and Estimation: Scalar and Array Processing
AD-A030 029/3CP

DUKE UNIV DURHAM N C DEPT OF ELECTRICAL ENGINEERING

TR-11
Adaptive Optimum Array Tracking Detectors
AD-A016 590/2CP

EQN Models for the Analysis and Design of a Computer Network of Functionalized Processors
(ARO-14533.1-A-EL)
AD-A045 721/8CP

CORPORATE AUTHOR INDEX

ELECTRO-VOICE INC BUCHANAN MICH MILITARY ENGINEERING DEPT

Linear Noise-Attenuating Earphone
(ECOM-76-0149-F)
AD-A048 846/0CP

ELECTROMAGNETIC COMPATIBILITY ANALYSIS CENTER ANNAPOLIS MD

ECAC-PR-77-012
Automated UHF Frequency Assignment System for FAA Air Traffic Control Communications
(FAA-RD-77-96)
AD-A047 847/9CP

EMC Analytical Models for Programmable Desk Top Calculators
PB-239 680/2CP

ELECTRONICS ENGINEERING GROUP (1842ND) RICHARDS-GEBAUR AFB MO

1842 EEG/EEIMM-TR-77-17
Design Specification for AFCS Universal Performance Assessment and Control System
AD-A040 926/8CP

1842 EEG/EETDD-TR-77-12
Evaluation of the Burroughs 3500 CRT Enhancement Program Communications System
AD-A037 086/6CP

ELECTRONICS ENGINEERING GROUP (1842ND) SCOTT AFB ILL

1842 EEG/EETS-TR-78-2
Data Network Referee (DNR) Concept Report
AD-A056 960/8CP

ESL INC SUNNYVALE CALIF

ESL-TM887
Users Guide for the MILSATCOM Loading Program 'OPAL'
(AD-E100-059)
AD-A054 879/2CP

ESL-TM888
Description of the MILSATCOM Loading Program 'OPAL'
(AD-E100-057)
AD-A054 878/4CP

ESL-TM938
Users Guide for the MILSATCOM Loading Program 'OPAL': GPSCS Addendum
(AD-E100-060)
AD-A054 881/8CP

ESL-TM939
Description of the MILSATCOM Loading Program 'OPAL': GPSCS Addendum
(AD-E100-058)
AD-A054 880/0CP

EVALUATION TECHNOLOGIES INC ARLINGTON VA

COMMEL II User's Manual. Volume I. Model Overview
(CAA-D-76-6-Vol-1)
AD-A031 613/3CP

COMMEL II User's Manual. Volume II. Input Data Preparation
(CAA-D-76-6-Vol-2)
AD-A031 614/1CP

COMMEL II User's Manual. Volume III. Appendixes
(CAA-D-76-6-Vol-3)
AD-A031 615/8CP

FARMERS HOME ADMINISTRATION, WASHINGTON, D. C.

TELOCOMM MEMO-9-01-77
MERTL (Multidrop Efficiency Regarding Transmission Lines)
PB-271 320/4CP

FEDERAL COMMUNICATIONS COMMISSION, WASHINGTON, D.C. BROADCAST BUREAU.

RADIAT Computer Program
(FCC/DF-76/008)
PB-260 426/2CP

A User's Guide to RADIAT, CONTOUR, CLIPPING, SKYWAVE
(FCC/DF-76/008a)
PB-260 427/0CP

FEDERAL COMMUNICATIONS COMMISSION, WASHINGTON, D.C. COMMON CARRIER BUREAU.

CC-7201
Geostationary Orbit Avoidance Computer Program
PB-211 500/CP

Geostationary Orbit Avoidance Computer Program (Card Deck)
PB-211 501/CP

FEDERAL COMMUNICATIONS COMMISSION, WASHINGTON, D.C. RESEARCH AND STANDARDS DIV.

FCC/OCE/RS74-01
VHF-TV, Computer Assignment Program (VCAP)
PB-236 272/1CP

FCC/OCE/RS74-03
User's Manual for COORD (FCC Coordination Contour Program for Domestic Satellite Earth Stations)
PB-240 199/0CP

FCC/OCE/RS74-05
FCC Coordination Contour Program for Domestic Satellite Earth Stations
(FCC/DF-74/024)
PB-241 628/7CP

FCC/OCE/RS75-01
The Quasi-Stationary Satellite Orbit
PB-240 349/1CP

FCC/OCE/RS75-02
(UCAP) - UHF-TV Channel Assignment Program
PB-241 307/8CP

FCC/OCE/RS75-04
Convolution Method of Interference Calculation. User's Manual and Results
PB-241 306/0CP

FCC/OCE/RS76-01
Field Strength Calculation for TV and FM Broadcasting (Computer Program TVFMFS)
PB-249 144/7CP

FCC/OCE/RS76-02
TV and FM Broadcasting Field Strength (TVFMFS) Computer Program
(FCC/DF-76/002)
PB-251 129/3CP

FCC/OCE/RS76-04
Satellite System Interference Modeling (11.7-12.2 GHz)
PB-258 737/6CP

FEDERAL COMMUNICATIONS COMMISSION, WASHINGTON, D.C. RESEARCH DIV.

R-7201
PERDIS. A Computer Program to Determine if Two Antenna Beams Intersect and Provide the Perpendicular Distance Between the Beam Axes
PB-221 257/9CP

FEDERAL COMMUNICATIONS COMMISSION, WASHINGTON, D.C. SPECTRUM MANAGEMENT TASK FORCE.

FCC/OCE/SMTF-75-01
AFAM: Automatic Frequency Assignment Model
PB-243 555/0CP

PERDIS Bearing and Distance Computer Program
PB-210 582/CP

FEDERATION OF ROCKY MOUNTAIN STATES, INC., DENVER, COLO.

NASA-CR-144746
Data Collection Operational Support System, Part 1.
N76-22246/2CP

FOREST SERVICE, WASHINGTON, D.C.

USFS-R-74-01
Wilderness Area Simulation Model - User's Manual
PB-233 364/9CP

USFS-R-74-02
Wilderness Area Simulation Model
PB-233 488/6CP

FORSVARETS FORSKNINGSANSTALT, STOCKHOLM (SWEDEN). AVDELNING 3.

FOA-3-C-3597-63
Equipment for Experimental Study of Communication Via Meteor Track
N71-26533/CP

GENERAL DYNAMICS/CONVAIR, SAN DIEGO, CALIF. ADVANCED SPACE SYSTEMS.

GDC-DCF70-003-VOL-4
Information Transfer Satellite Concept Study. Volume 4 Computer Manual
N72-18864/CP

NASA-CR-114314
Information Transfer Satellite Concept Study. Volume 4 Computer Manual
N72-18864/CP

GENERAL DYNAMICS/ELECTRONICS ROCHESTER N Y

Scate Mark V, Feasibility Demonstration.
AD-709 638/CP

GENERAL DYNAMICS/ELECTRONICS SAN DIEGO CALIF

R-69-046-05
Study of Electronic Handling of Mail. Completion Report for Work Task 5. Transmission Methods.
AD-715 121/CP

GENERAL ELECTRIC CO., BETHESDA, MD. INFORMATION SERVICES BUSINESS DIV.

Teleprocessing Systems Study. Volume I
(OTP-73-TP-1)
PB-220 657/1CP

Teleprocessing Systems Study. Volume II. User Instruction Manual
(OTP-73-TP-2)
PB-220 658/9CP

Teleprocessing Systems Study. Volume III. Program Listings and Documentation
(OTP-73-TP-3)
PB-220 659/7CP

Teleprocessing Systems Study. Description of the Model
(OTP-73-TP-4)
PB-220 660/5CP

GENERAL ELECTRIC CO SANTA BARBARA CALIF TEMPO

GE73TMP-20
WEPH V Code Modifications for HF Propagation and System Performance Modeling
(DNA-3153T)
AD-770 053/7CP

GENERAL ELECTRIC CO., SYRACUSE, N.Y. ELECTRONICS LAB.

NASA-CR-115743
Electronic Scene Generator Expansion System
N72-28232/CP

GENERAL RESEARCH CORP SANTA BARBARA CALIF

CR-1-520-VOL-20
The ROSCOE Manual. Volume 20 - Satellite Communication Model
(SBIE-AD-E300-046)
AD-A047 918/8CP

GEORGIA INST OF TECH ATLANTA ELECTRONICS TECHNOLOGY LAB

Interactive Communication Systems Modeling Study
(RADC-TR-76-155)
AD-A026 409/3CP

Interactive Communication Systems Modeling Study
(RADC-TR-77-42)
AD-A037 833/1CP

GRENOBLE UNIV. (FRANCE). LAB. DE MATHEMATIQUES APPLIQUEES.

ESA-CR(P)-901-V-3
Development of Smoothing Spline Functions for Telemetry Data. Volume 3: Programs and Numerical Results Etude du Developpement des Fonctions-Spline de Lissage pour des Donnees de Telemesure. Volume 3 (Programmes et Resultats Numeriques).
N77-21913/7CP

GTE SYLVANIA INC NEEDHAM HEIGHTS MASS

NUCOM/BREM. An Improved HF Propagation Code for Ambient and Nuclear Stressed Ionospheric Environments
(AD-E300-141)
AD-A058 867/3CP

GTE SYLVANIA INC NEEDHAM HEIGHTS MASS ELECTRONIC SYSTEMS GROUP-EASTERN DIV

Adaptive Multilevel 16KB/S Speech Coder
AD-A031 516/8CP

Supplemental Conceptual Design Study of an Integrated Voice/Data Switching and Multiplexing Technique for an Access Area Exchange
AD-A034 132/1CP

HARRIS CORP., MELBOURNE, FLA. ELECTRONIC SYSTEMS DIV.

NASA-CR-141708
Performance Analysis of Wideband Data and Television Channels.
N75-19481/1CP

REPT-9300-75-001
Performance Analysis of Wideband Data and Television Channels.
N75-19481/1CP

Multiplex Simulator Design Study
(AFAL-TR-76-201)
AD-A037 226/8CP

Fiber Optics Design Aid Package
(RADC-TR-77-163)
AD-A040 772/6CP

Cross Polarization Techniques Investigation
(RADC-TR-77-244)
AD-A043 395/3CP

Analysis of Jitter Characteristics in a Pulse Stuffing TDM Network
(AD-E100-005)
AD-A049 310/6CP

HARRIS-INTERTYPE CORP MELBOURNE FLA RADIATION SYSTEMS DIV

Recursive Algorithms for Adaptive Array Antennas
(RADC-TR-74-46)
AD-778 947/2CP

HARRY DIAMOND LABS ADELPHI MD

HDL-TR-1715
Signal Analysis and Parametrization for EMP Data
AD-A020 493/3CP

HONEYWELL INC ST PETERSBURG FLA

Security Kernel Specification for a Secure Communications Processor
(ESD-TR-76-359)
AD-A045 452/0CP

HONEYWELL INC ST PETERSBURG FLA AEROSPACE DIV

476-13656-Vol-3
ATEC Digital Adaptation Study. Volume III. Summary and Recommendations
(RADC-TR-76-302-Vol-3)
AD-A033 716/2CP

HONEYWELL INFORMATION SYSTEMS INC MCLEAN VA FEDERAL SYSTEMS OPERATIONS

Minimizing the Naming Facilities Requiring Protection in a Computing Utility

(ESD-TR-76-161)
AD-A031 909/5CP

Security Kernel Evaluation for Multics and Secure Multics Design, Development and Certification
(ESD-TR-76-298)
AD-A038 261/4CP

HOUSTON UNIV., TEX.

The Economic Comparison of One-Way Paging and Full Two-Way Radio Service
COM-75-11141/9CP

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NASA-CR-119003
Study and Development of a Mathematical Analysis for the Performance Assessment of Space Communication System Parameters Final Report
N71-28162/CP

P68-267
Study and Development of a Mathematical Analysis for the Performance Assessment of Space Communication System Parameters Final Report
N71-28162/CP

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N76-16129/8CP

IBM FEDERAL SYSTEMS DIV OWEGO N Y

Program Documentation for the Digital Switching Experiment Program
(AMRL-TR-76-42)
AD-A030 363/6CP

IIT RESEARCH INST ANNAPOLIS MD

FAA Remote Terminal System
(ECAC-PR-77-067)
AD-A054 604/4CP

An Automated FAA Frequency Assignment System
(FAA-RD-73-184)
AD-779 086/8CP

IIT RESEARCH INST CHICAGO ILL

IITRI-E6249-1
Interference Mitigation Studies for Texas Telephone and Power Distribution Systems
AD-768 072/1CP

IITRI-E6276
EMP Response of Parabolic Reflector Antennas
AD-776 399/8CP

ILLINOIS UNIV AT URBANA-CHAMPAIGN COORDINATED SCIENCE LAB

Hardware and Software Error Correction Coding
(RADC-TR-75-217)
AD-A017 377/3CP

ILLINOIS UNIV AT URBANA-CHAMPAIGN DEPT OF COMPUTER SCIENCE

UIUCDCS-R-76-812
A Microprocessor-Controlled Interface for Burst Processing
AD-A030 226/5CP

ILLINOIS UNIV URBANA COORDINATED SCIENCE LAB

R-622
Computer Simulation of Error-Correcting Codes
AD-777 198/3CP

UILU-ENG-73-2224
Computer Simulation of Error-Correcting Codes
AD-777 198/3CP

INPUT OUTPUT COMPUTER SERVICES INC CAMBRIDGE MASS

Software for an Experimental Air-Ground Data Link. Volume III. Program Listings
(TSC-FAA-75-21-3)
AD-A019 964/6CP

Single-Channel Voice-Response-System Program Documentation. Volume I. System Description
(TSC-FAA-77-24.1)
AD-A051 543/7CP

INSTITUTE FOR TELECOMMUNICATION SCIENCES BOULDER COLO

Objective Measurement of Voice Channel Intelligibility
(FAA-RD-77-153)
AD-A048 611/8CP

Propagation Model (0.1 to 20 GHz) Extensions for 1977 Computer Programs
(FAA/RD-77/129)
AD-A055 605/0CP

INSTITUTE FOR THE FUTURE MENLO PARK CALIF

SR-34
ARPA Policy-Formulation Interrogation Network
AD-A002 489/3CP

ITT DEFENSE COMMUNICATIONS DIV NUTLEY N J

Phased Array Antenna Amplifier Exploratory Development Model (100 watts)
(ECOM-77-0146-1)
AD-A056 173/8CP

JAPAN BROADCASTING CORP., TOKYO. TECHNICAL RESEARCH LABS.

NHK-TECH-MONO-22
Computer-Aided Design in Television Circuits.
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N72-22313/CP

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N71-33163/CP

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The Deep Space Network, Volume 8
N72-22313/CP

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The Deep Space Network.
N77-21110/0CP

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State Criminal Justice Telecommunications (Stacom). Volume 4: Network Design Software User'S Guide.
N78-16221/1CP

PR-42-38
The Deep Space Network.
N77-21110/0CP

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Review of Finite Fields: Applications to Discrete Fourier, Transforms and Reed-Solomon Coding.
N77-33875/4CP

NASA-CR-155167
Review of Finite Fields: Applications to Discrete Fourier, Transforms and Reed-Solomon Coding.
N77-33875/4CP

JOHNS HOPKINS UNIV LAUREL MD APPLIED PHYSICS LAB

APL/JHU/TG-1293B
URLIM - A Unified Radome Limitations Computer Program. Volume 2. User's Guide
AD-A057 459/0CP

JOINT TACTICAL COMMUNICATIONS OFFICE FORT MONMOUTH N J

TTO-ORT-032-76A-V3-APF
Cost Effectiveness Program Plan for Joint Tactical Communications. Volume III. Life Cycle Costing. Appendix F. Computer Models for LCC
AD-A027 643/6CP

TTO-ORT-032-78B-V3-AP-F
Cost Effectiveness Program Plan for Joint Tactical Communications. Volume III. Life Cycle Costing. Appendix F. Computer Models for LCC
AD-A056 981/4CP

KANSAS UNIV/CENTER FOR RESEARCH INC LAWRENCE

A Study of (AFCS) Communications Measurement Program
(RADC-TR-73-312)
AD-775 163/9CP

KENTUCKY UNIV., LOUISVILLE. DEPT. OF ELECTRICAL ENGINEERING.

NASA-CR-130272
Development of Communications Analysis Techniques
N73-16125/CP

TR-EE-72-102
Development of Communications Analysis Techniques
N73-16125/CP

KIRUNA GEOPHYSICAL OBSERVATORY (SWEDEN).

KGO-73-3
Vlf Receiver Calibration.
N74-19103/2CP

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A Computer Program for Evaluating Radio Signal Propagation from Artificial Earth Satellites.
N70-27491/CP

LANE COUNTY GOVERNMENT, EUGENE, OREG. USAC PROJECT.

USAC-LCG2-0015
TCDMS Utilities Manual (Data Management Section)
PB-250 992/5CP

The Telecommunication/Data Management System (TCDMS) IBM Assembler Language Computer System Magnetic Tape, Release No. 2
(HUD/DF-76/003)
PB-250 763/0CP

LEHIGH UNIV BETHLEHEM PA DEPT OF INDUSTRIAL ENGINEERING

IE-77-OR-1
Extensions of Stochastic Network Theory to Facilitate the Development of MOE's for Communication Systems
AD-A041 314/6CP

LOGICON INC SAN DIEGO CALIF

LISTEN: A System for Recognizing Connected Speech Over Small, Fixed Vocabularies, In Real Time
(NAVTRAEQUIPC-77-C-0096-1)
AD-A056 231/4CP

LOS ALAMOS SCIENTIFIC LAB., N.MEX.

Noise Immunity in Digital Communication by Use of Orthogonal Signal Correlation and Walsh Functions.
LA-5896

LOS ALAMOS SCIENTIFIC LAB., N.MEX. (USA).

CONF-740512-2
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LA-UR-74-509

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ESA-CR(P)-878-V-2
Analytic Techniques for Processing Signal and Noise Through a Non-Linear Channel Using Modsim. Volume 2: Software Description.
N77-18784/7CP

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